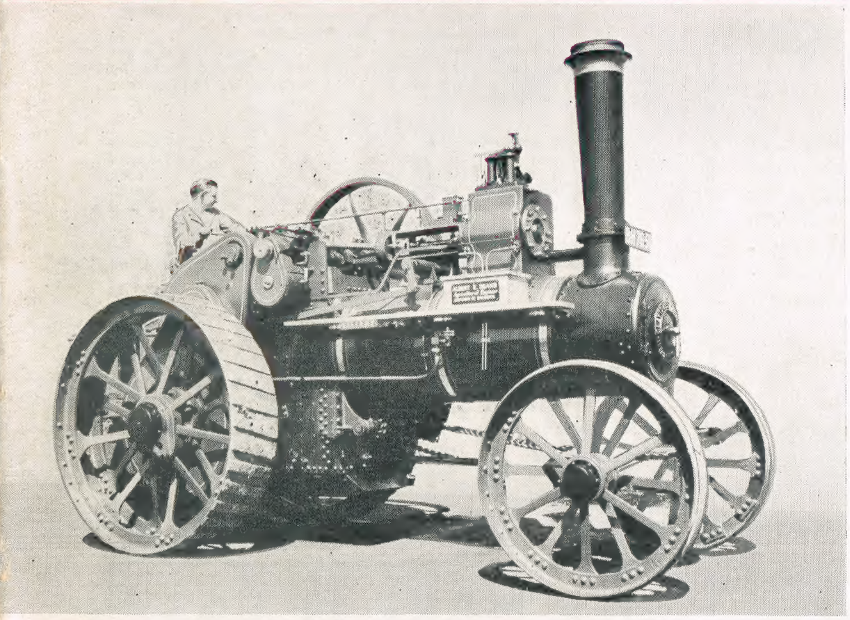
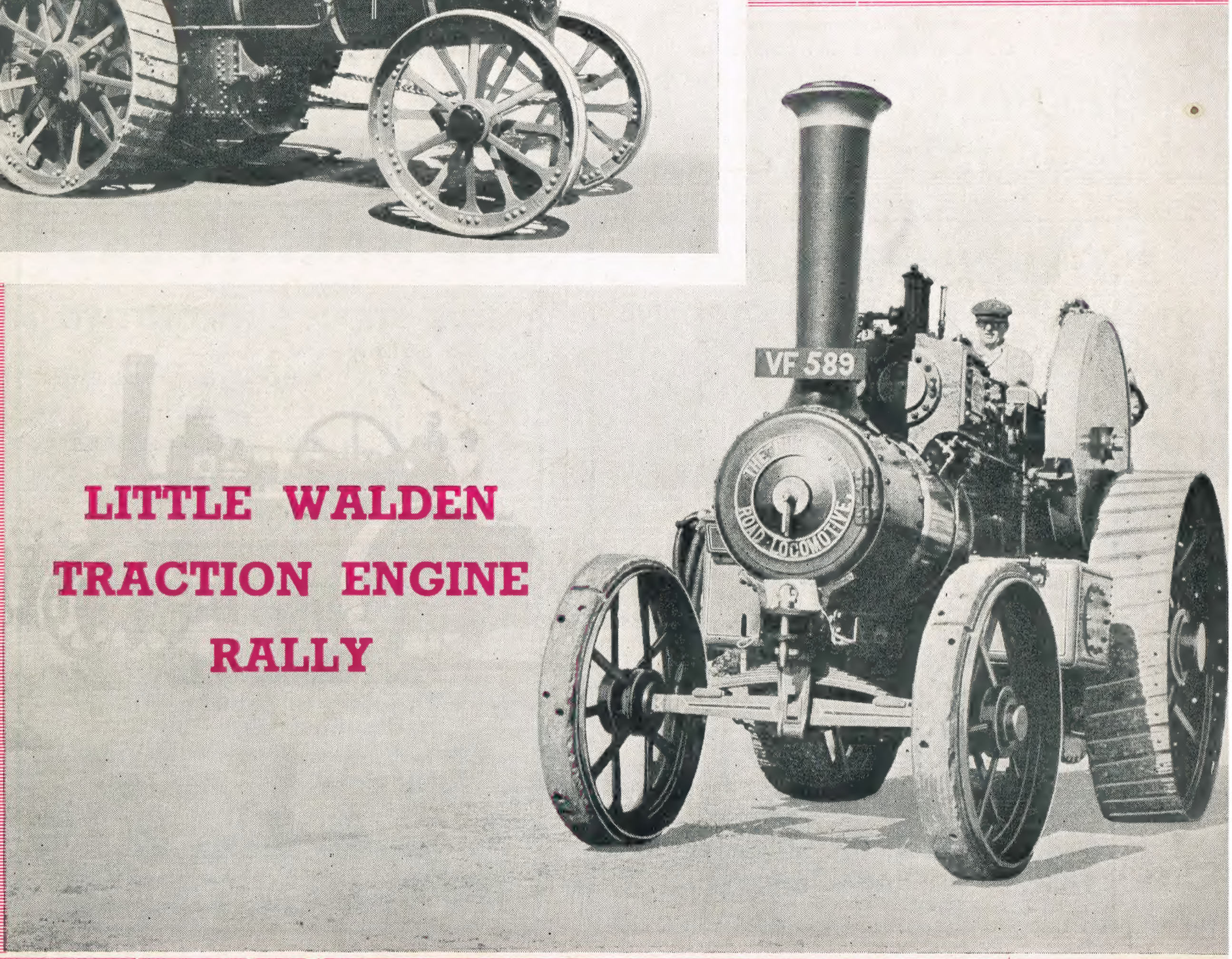
Model Engineer

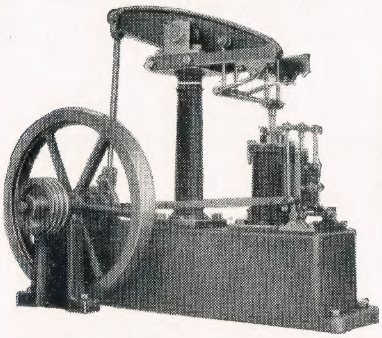
THE MAGAZINE FOR THE MECHANICALLY MINDED





LITTLE WALDEN
TRACTION ENGINE
RALLY

ONE SHILLING 8 AUGUST 1957 VOL 117 NO 2933



Why a BEAM ENGINE?

Because it is a fascinating engine to watch in motion. Every moving part (except the Slide valve) can be seen and Watts' Parallel motion is of never failing interest. Because it runs slowly, it only needs a quite small boiler. It is one of the Simplest engines to build.

Complete set of castings and all materials

£3 17s. 6d.

Including postage & Purchase Tax £5

Abroad: there is no Purchase Tax

Our catalogue is **1s.** post free.

STUART TURNER L^TD

HENLEY-ON-THAMES, OXON

BOND'S

AMERICAN "MONOGRAM" WATER LINE SHIP KITS

Each kit makes up a model approximately 16″ long. The kit contains a shaped balsa wood hull, printed balsa wood parts, templates, etc., and a detail drawing.

Kit B.1. L.S.T. Landing Craft	Kit B.3. U.S. Cruiser "Chicago"
Kit B.2. U.S. Destroyer	Kit B.4. U.S. Battleship "Missouri"

Price **15**/- per kit

Packing and Postage **1**/-

BOAT PROPELLERS AND SHAFTS
THREE-BLADE PROPELLERS

We can now supply a full range of 3-blade brass propellers that are correctly made, having each blade formed and pitched correctly by special tools. These will improve the performance of any displacement boat. Left hand or right hand.

PRICES

$1\frac{1}{4}$″ diam. 1.8″ pitch threaded 7-B.A. ...	**5/6** each
$1\frac{1}{2}$″ diam. 3″ pitch threaded 5-B.A. ...	**6/6** each
2″ diam. 3″ pitch threaded 5-B.A. ...	**7/6** each
$2\frac{1}{2}$″ diam. 4″ pitch threaded 5/32 Whit. ...	**9/6** each
3″ diam. 4″ pitch threaded 3/16 Whit. ...	**11/6** each

PROPELLER SHAFTS

Fitted with nickel silver shafts and brass tubes.
The tubes are bushed both ends and fitted with a packing gland and T type driving dog.

PRICES

6″ long threaded 7-B.A. ...	**6/3** each
8″ long threaded 5-B.A. ...	**9/-** each
12″ long threaded 5-B.A. ...	**11/-** each
15″ long threaded 5/32 Whit. ...	**16/9** each
18″ long threaded 3/16 Whit. ...	**22/-** each

All prices plus packing and postage.

Bonds Model Catalogue. Price **2**/-.

Bonds Tools, Gear, Steam Fitting and Material Catalogue. Price **1/9**.

BONDS O' EUSTON ROAD LTD.

357, EUSTON ROAD, LONDON, N.W.1

Est. 1887 Phone: EUSton 5441-2

"LICKHAM HALL"

4-6-0 HALL CLASS LOCOMOTIVE in $3\frac{1}{2}$″ gauge

Designed by "L.B.S.C."

This scale version of the popular "Hall" Class locomotives has been **designed by "L.B.S.C." EXCLUSIVELY for A. J. Reeves.**

BLUEPRINTS FROM "L.B.S.C's" ORIGINAL DRAWINGS,

12 sheets at **3/6d.** per sheet

SEND NOW FOR FREE LIST OF CASTINGS

A 6d. stamp will bring you a copy of our comprehensive lists of blueprints, castings and materials for many "L.B.S.C." designed small steam locomotives; workshop equipment; boat kits and radio control equipment.

"THE CHOICE OF EXPERIENCE"

A. J. REEVES & CO. (Birmingham) LTD

416, MOSELEY ROAD, BIRMINGHAM 12

Telephone: CALthorpe 2554

WE MAKE IT EASY

for you to build a

LIVE STEAM LOCOMOTIVE

We do the heavy machine work

You do the filing and drilling

Send 50c (4s.) for our catalog

CASTINGS — PLANS — RAIL — SUPPLIES

LITTLE ENGINES

BOX K, LOMITA, CALIFORNIA, U.S.A.

PRECISION GEARS

Spur Gears — 24-100 D.P.
Bevel Gears Mitre & Ratio,
Worm Gears and Reduction Boxes,
Crossed Helical Gears — Racks,
Ground Shafting — Collars — Ratchet Wheels.

Send for complete list. *Phone* 20231-2

Made by S. H. Muffett, Ltd. Estd. 1920

PRECISION PRODUCTION ENGINEERS
Mount Ephraim Works, Tunbridge Wells

MORE WORKSHOP MANUALS

SCREW THREADS AND TWIST DRILLS *by " Duplex."* This book, besides giving much tabulated information, is a practical guide to some of the operations more commonly carried out in the small workshop with either hand or machine tools. Screw threads, screw threading equipment and methods are subjects dealt with, as are also screw cutting equipment and operations, and twist drills. 88 pages. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

SHARPENING SMALL TOOLS *by " Duplex."* The authors, well known for their " Workshop " articles in MODEL ENGINEER, have dealt in detail with tools in general use. The book includes chapters on abrasive materials, stoning and grinding, sharpening metalwork and woodworking tools, knives, scissors, razors and drawing instruments. 112 pages. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

BEARINGS AND HOW TO FIT THEM *by Ian Bradley and Norman Hallows.* Deals with main principles and gives many examples of bearing design with clear, simple diagrams. Plain bearings, ball bearings and roller bearings are all described in detail, including the best materials and methods for making them. The book also explains how they can be used in the small workshop. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

ELEMENTARY WOODWORK *by F. H. Harmsworth.* Explains the basic woodworking processes in simple language with the help of numerous photographs, diagrams and drawings. Consideration is given to the choice of tools and equipment, timber, tool manipulation, joints, various fastenings for wood, construction of equipment for the woodwork shop, &c. The book also explains the basic principles of pattern making, fret-sawing, circular sawing, easy veneering, simple gouge and low relief carving, &c. Also turning, metal fittings, wood finishing, design, &c. 152 pages. **5s. 3d.** post paid (U.S.A. and Canada $1.25 post paid).

WELDING AND CUTTING *by J. A. Oates.* Describes the welding and cutting of metals by the oxy-acetylene and metallic arc processes and gives the reader essential information in simple non-technical language about the chemical and metallurgical processes involved. Contents include: the prevention of distortion; gas welding equipment and techniques; gas welding of various metals; flame cutting methods; electric arc welding and equipment; metallic arc welding procedure; also a chapter on the techniques for various metals. 96 pages, 44 diagrams. **5s.**, post 3d. (U.S.A. and Canada $1.25 post paid).

WOOD TURNING FOR THE BEGINNER *by Alan Macbeth.* A description in simple manner of the operation of the lathe in relation to wood turning. Chapters deal with workshop layout, types of lathes and their attachments, including a home-made lathe, tools and instruments, choice of timber, mounting and turning and finishing and polishing. There is a list of simple objects suitable for the beginner, each of practical use and illustrated. 96 pages, illustrated. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

GRAVITY DIE-CASTING PRACTICE *by G. W. Lowe.* Description of a process in which permanent metal moulds are used for the purpose of casting. The book covers: application and design of gravity die-castings; fundamentals of design; single gravity dies; a more complicated gravity die; the semi-permanent mould; use of the collapsible core; die manufacture in the toolroom; casting operations in the foundry; finishing; pressure die-casting and slush casting. 65 pages, illustrated. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

TOOLMAKING HINTS AND TIPS *by R. Hutcheson.* This handbook of useful methods and equipment for the tool-room has been in very great demand since it was first published. Consideration is given to the following: The work of the tool-room. The vernier and how to read it. The use of the sine bar. Making a sine bar. Sine bar with inserted plugs. Accurate squares. Toolmakers' buttons. Marking-out holes on a circle. Jig bushes. Forming-cutters and their uses. Making forming-cutters. Measuring tapers. Slip and block gauges. Making tool-room mandrels. 84 pages illus. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

HOW TO READ WORKSHOP DRAWINGS *by W. Longland (revised and re-illustrated by E. W. Twining).* A practical guide to the ready understanding of the working drawings used in the engineering and allied industries. Matters covered include: Plan and elevation; right use of perspective; conventional signs and lines; hatching; use of colour, shade lining; sectional views; screens; part sections; reading of the sectional plan; change of section; half views; general arrangement of connecting rod end; blueprints; working limits; tolerance; electrical symbols. **3s. 6d.**, post 3d. (U.S.A. and Canada $1.00 post paid).

HOW TO WORK SHEET METAL *by Herbert J. Dyer.* 142 pages. Practical description of metalworking techniques based on 25 years' experience in the Shop. Hundreds of helpful diagrams and photographs; many useful tips on constructing your own bench, equipment, etc. **5s.**, post 3d. (U.S.A. and Canada $1.25 post paid).

From your bookseller, or by post by completing Order Form below

M.E. DETACH ALONG DOTTED LINE

ORDER NOW

To Percival Marshall & Co. Ltd., 19-20, Noel Street, London, W.1

Please supply by return of post

NAME (Mr., Mrs., Miss)..............................
BLOCK LETTERS PLEASE

....
TITLE OF BOOK

ADDRESS..

....
TITLE OF BOOK

....

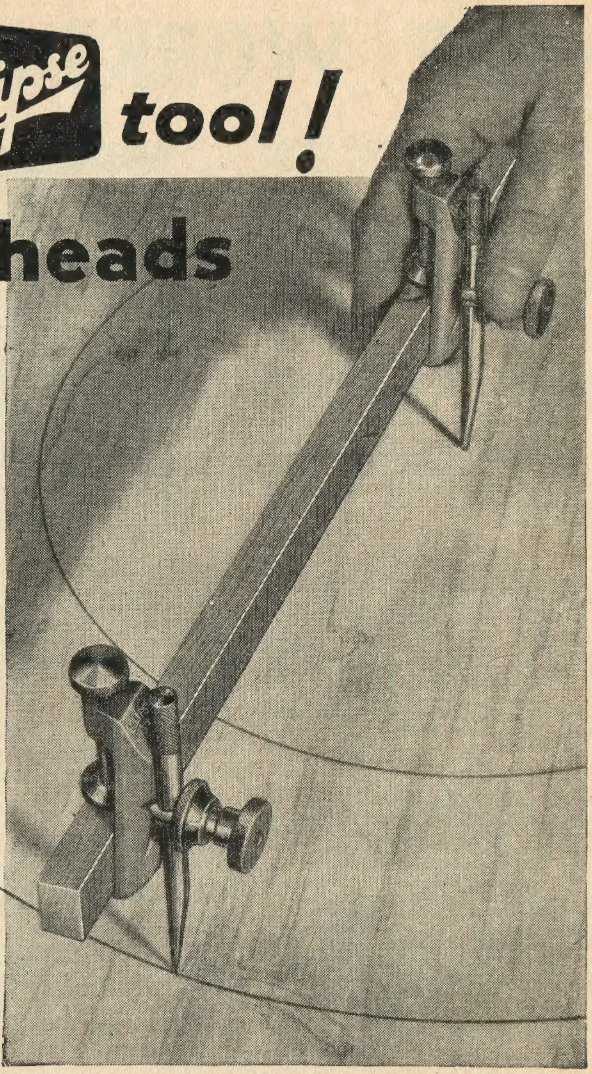
I enclose remittance value £ : : d.
to cover postage and packing.

....

(Overseas customers can use an International Money Order)

Another **Eclipse** tool!

trammel heads



for joiners, pattern makers, sheet metal workers

Mounted on a suitable beam, "Eclipse" Trammel Heads provide an efficient and convenient means of laying out the distance between two points and of scribing arcs and circles outside the capacity of ordinary dividers. They are equally useful for metal, wood and plastics and are therefore invaluable for pattern makers, joiners, sheet metal workers, machinists, etc.

As the stiffness of the beam should be related to its length, the trammel heads are open sided and are fitted with a clamping screw of ample size in order that they can be secured firmly to any piece of wood of suitable thickness and of between $\frac{3}{4}$" and $1\frac{1}{2}$" width.

The points, which are hardened and ground, are secured to the body by means of a clamp and are eccentric, so that after the body has been clamped on the beam in approximately the correct position, final adjustment can be made by rotating the point before clamping it to the body; the degree of adjustment thus provided by each point is $\frac{1}{16}$".

The clamp which screws the point to the body can be swivelled and the body is grooved both vertically and at 45°, so that the point can be held with equal rigidity in either position—the angular setting being essential when marking under a ledge or similar obstruction. When required, a pencil can be used in place of the point.

Made by James Neill & Co. (Sheffield) Ltd., and obtainable from all tool distributors

Model Engineer

ONE SHILLING 8 AUGUST 1957 VOL. 117 NO 2933

Published every Thursday Subscription 58s. 6d. (USA and Canada $8.50) post free

In this issue

Next week

4.5 in. Howitzer: Description of an outstanding model

What to see at the ME Exhibition: A preview of some of the entries

Ship building for beginners

Model power boat regattas

The Editor is pleased to consider contributions for publication in MODEL ENGINEER. Manuscripts should be accompanied by photographs and/or drawings and should have a stamped addressed envelope for their return if unsuitable. None of the contents of MODEL ENGINEER may be reproduced without written permission. All correspondence should be addressed to the Editor, Model Engineer, 19-20 Noel Street, London, W1.

Smoke Rings

A WEEKLY COMMENTARY BY VULCAN

THE proposed visit of Russian model engineers to last year's Model Engineer Exhibition was a story of hope and frustration.

I need hardly remind readers that the visit was finally cancelled because visas were not available, although the matter remained in doubt until the final stages of the Exhibition.

It is with some trepidation, therefore, that I again broach the subject. I can say with confidence that the Russians fully intend to come this year. A five-man delegation is planned and in a letter this week, they say:

"In order to establish friendly relations between the modellers of the Soviet Union and your country, the Central Marine Model Club of the USSR has decided to send a delegation of marine modellers to London. With our delegation we are going to send some of our best amateur models to your Exhibition. They will be models of different classes.

"Our Club has already asked the British Embassy in Moscow, through the Foreign Office of the USSR, with a request about entry visas to your country from 15 August 1957, in order that our delegation may have some time to prepare our models by the official opening of the Exhibition."

Formidable challenge

From what I have seen in pictures of their work, the Russian entry is likely to be a formidable challenge in the competition classes. They are also keen to take part in a regatta and I have no doubt that an invitation will be forthcoming to them to compete in the Grand Regatta, which takes place on the Sunday following the Exhibition.

In view of last year's happenings, I need only add that I am keeping my fingers crossed that there should not be a slip-up this year.

There is every indication that this year's Exhibition will once again have the international flavour which has distinguished it in the past, but there is little doubt that the presence of Russian models—with the opportunity to compare their craftsmanship and ingenuity—will be a great fillip to the 1957 Exhibition.

Emett's approval

ROWLAND EMETT, one of whose drawings used to decorate this page, has already seen the Oyster Creek Railway to be shown at the Model Engineer Exhibition. He likes it.

The famous humorous artist, whose work is appreciated in the United States as well as in Britain, has his home at Ditchling in Sussex. To discover what sort of a railway Anthony Jacobs and Barrie Deamer had built he called on them at Walthamstow where they live. His comment was: "By far the best imitation I have ever seen."

In the exhibition held at Walthamstow by Chingford and District MEC (ME for May 2) the OCR occupied an annexe with F. A. Barrett's carefully

Smoke Rings . . .

composed layout, another special attraction at the Model Engineer Exhibition this month.

The two modellers, both young men at the BBC, have represented every familiar detail in a space 11 ft × 2 ft. Clever use has been made of wood and paper and the whole has an air of gay eccentricity.

Steam enthusiast

ANTHONY BEAUMONT, whose splendid pictures of a traction engine rally appear in this issue, lives at King's Lynn in Norfolk, and is a secondary modern schoolmaster. He will be deputy headmaster when the school resumes next month.

Anthony Beaumont

He has been building model ships since he was eight years of age but has been seriously engaged on model engineering since 1946. He is one of the numerous people who are "self taught with the aid of the ME." Steam is his prime interest and his home-made type of traction engine gained a 1st at Norwich in 1950. Recent steam models include a coal-fired tug, steam cruiser and various engines to E. T. Westbury's designs.

Mr Beaumont, whose articles and pictures are always of interest, has his workshops in a large weather-boarded garden shed, where the temperature in summer is 90° and where an oil stove does battle with cold and rust in the winter.

Old friends

DOES anyone know the later history or ultimate fate of a traction engine known by the Dickensian name of *Tiny Tim*?

In 1919 H. Lakeman was on holiday with grown-up relatives at Filey in Yorkshire when he chanced to pass a small fair and there, on the edge of the fairfield, thudding away in the shadows, was a handsome Burrell. While he stood admiring, a showman came forward and invited him to a closer inspection.

This was Mr Lakeman's first meeting with Jim Corrigan and *Tiny Tim*. They kept in contact, as far as geography allowed, until the end of Mr Lakeman's schooldays, and then lost touch for thirty years.

I can imagine Mr Lakeman's pleasure when he met his old friend again last year, and his further pleasure on finding that the old showman, though now in his nineties, remembered him as a boy.

"But I wonder," writes Mr Lakeman in the bulletin of the West Riding Small Locomotive Society, "what has happened to the engine? Can it be that it still exists?"

Guard of honour

BOY Scouts formed a guard of honour on Platform 7 at Euston Station, London, when Lord Rowallan, the Chief Scout, gave his name to Britannia No 70045 on the Midland Region. The locomotive was built at Crewe and has been in service since 16 June 1954.

One of the guests present at the unveiling of the nameplate was No 46169 *Boy Scout*, which in December, 1930, was named by Lord Baden-Powell on behalf of the Scouts of the Commonwealth.

There are in service 55 engines of the Britannia class and 71 of the Royal Scot, to which *Boy Scout* belongs. This 4-6-0 locomotive was built at Derby in 1930 and later was converted with tapered boiler and double chimney. The three cylinders are 18 in. × 26 in., the coupled wheels are 6 ft 9 in., and the tractive effort at 85 per cent is given as 33,150 lb. In working order the engine weighs about 137 tons 13 cwt, including nine tons of coal and 4,000 gallons of water.

Cover picture

Two of the many exhibits at the Little Walden, Essex, traction engine rally. Right: a 5 h.p. Burrell road locomotive MARY ANN *and, inset, a Clayton and Shuttleworth*—VALIANT.

Not a flying saucer

I EXPECT you remember the question in the House of Commons about a flying saucer which astonished the good people near Rochdale.

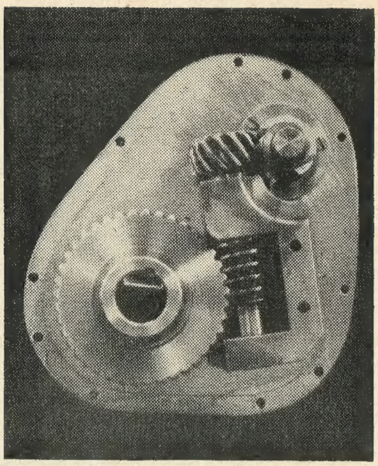
It was not, MPs were assured, a flying saucer at all but a device which a model engineer was using in the course of planning a model radio-controlled airship. No one need doubt this story. The model engineer is F. N. Robinson, of Norden Road, Bamford, and any reader who calls there for radio repairs or similar work will find him an enthusiast for radio-control.

So far he has not begun on the construction of his airship: there are so many other things to keep him busy. "Model engineering," he writes, "keeps me captivated though my main interest is in electronics and not in producing optical illusions over small Lancashire villages."

Emett, the cartoonist (right), is seen with the builders of the Oyster Creek Railway, which will be at the Model Engineer Exhibition

What to see at the ME Exhibition

First of three articles describing some of the models of outstanding interest at this year's Exhibition



Self-act feed gearbox by Mervyn Vest. The large 40 *t. wheel gives a* 40 *to* 1 *ratio; the smaller, a helical gear, gives* 2 *to* 1

LOCOMOTIVES

IN Class A, which is for locomotives of 2½ in. gauge or over, entry No 1 is a 2½ in. gauge engine of which the builder's description is of more than usual interest.

The design is based on the 4-4-4 tank engines built in 1910 by Sir Vincent Raven for the old North Eastern Railway; but the builder, Mervyn Vest, has incorporated tanks of Gresley's LNER pattern and has fitted outside Walschaerts valve gear. This idea seems rather like an inspiration that should produce quite a good-looking engine. Model engineers do sometimes indulge in flights of fancy like this, with pleasing results, occasionally.

One of the most popular of LBSC's many live-steam locomotives has been the 3½ in. gauge 2-4-0 express engine *Petrolea*, based on the old Great Eastern Railway engine of the same type and name. Several have been exhibited at past ME Exhibitions, and this year will see another; it is the work of Kenneth Dean, of Brentwood, and is a first attempt at model making. Its construction was started in 1951, but owing to three changes of residence since then, it has only recently been finished.

GENERAL ENGINEERING

ENTERPRISE and ingenuity are again shown in the exhibits entered in this section, proving that model engineers are always seeking new worlds to conquer, and are not bound by convention in their choice of subjects for modelling.

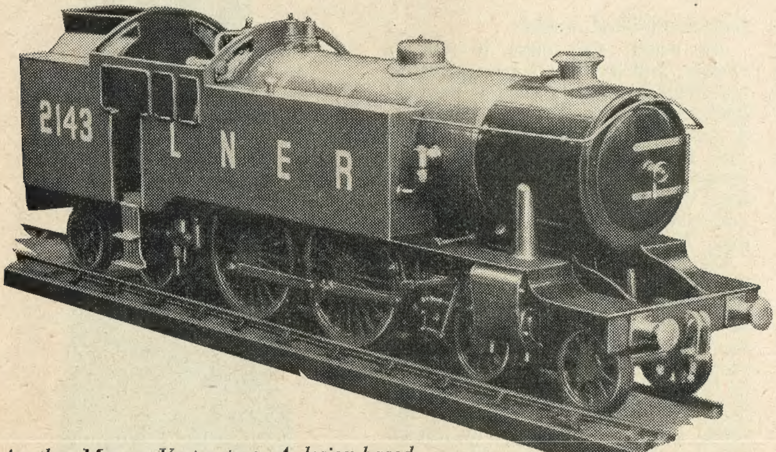
One very interesting exhibit is the working model of a Dobcross Underpick Tappet loom, to a scale of 2 in. to 1 ft, by T. W. Millward, a carpet manufacturer of Fallowfield, Manchester. It has been modified in detail to make it suitable for working in a reduced size, and incorporates drop box 2-shuttle motion; it is quite a practical machine, capable of weaving cross-check patterns.

Another unusual exhibit is the roller feed perforating machine by W. R. Coombe, a retired works superintendent of Hayle, Cornwall. This type of machine is employed in the production of perforated metal; the model is capable of working under power at the rate of 200 strokes per minute. All parts are cut from solid steel except for two castings for the ram housing, and all turning, milling and boring operations were carried out on a 3½ in. lathe.

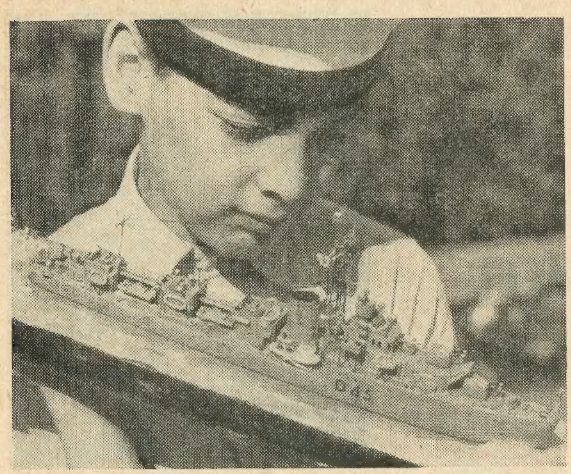
At the time of writing, only one entry has been received for a stationary steam engine; this is the beam engine by T. R. Martin, of Peckham, London, SE. This is mainly to the design of the Stuart Turner beam engine, and built from Stuart Turner castings, but it incorporates some features of the Vulcan beam engine as described in ME.

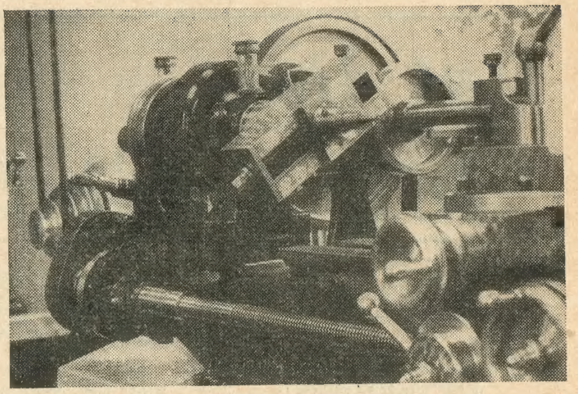
Entries in the internal combustion engine class are more numerous than they have been during the last two or three years, though still too few in relation to their general popularity. An example of the Seal Major 30 c.c. four-cylinder engine is entered by S. E. Hutson, a retired engineer, of Bexley, Kent, who states that its construction occupied two years of spare-time work. Mervyn Vest, a medical technician, of Newcastle upon Tyne, shows a 6 c.c. two-stroke petrol engine intended for installation in a model power boat.

The old question regarding the definition of a "working" model is raised by the part-sectioned ¼-scale model of a Norton Manx racing engine by H. W. Hooper, a despatch foreman, of Birmingham, who is well known as a past exhibitor of motor cycle models. Obviously a



Another Mervyn Vest entry: A design based on a 1910 4-4-4 *tank by Sir Vincent Raven*

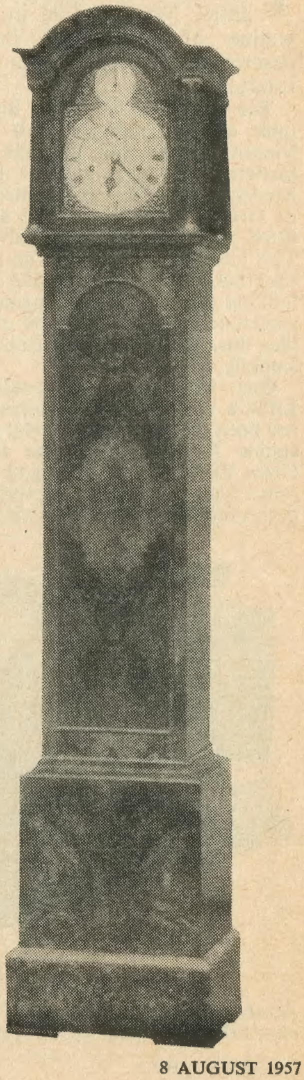




Above, left: Waterline model of the destroyer DODGER *by Adrian Bomback,* 11

Above, right: The boring head with traversing slide fitted to a lathe. It was designed by Mervyn Vest

Below: The prototype of the ME Musical Clock



partly sectioned engine cannot function normally, but it is a working model in that all working parts are correctly made and can be operated manually to demonstrate working principles. This model is of all-fabricated metal construction, and took about 600 hours to make.

Tools and equipment

Some very interesting machine tool attachments are featured in this class, including two items by Mervyn Vest, of Newcastle. The first is a fixed-ratio gearbox, to fit a 3½ in. lathe, for obtaining fine self-acting feeds. It is completely enclosed and oil-bath lubricated, incorporating two stages of worm gearing with a total reduction ratio of 80 to 1, but the ratio from mandrel to leadscrew can be varied by using different change wheels. The second exhibit is a boring head with traversing slide, designed to screw on the mandrel nose of a 3½ in. lathe. Both attachments are of original design, and all-fabricated construction.

A watchmaker's lathe is entered by J. H. F. Wadsworth, a horological student apprentice, of Birmingham. This has double taper roller bearings in the headstock and the bed is made from a 13 in. length of silver-steel bar. Most of the work was done in a school workshop, including milling operations on a 6 in. lathe.

R. J. Perry, an apprentice toolmaker, of Harlow, Essex, exhibits a machine for dividing and marking scales, including vernier scales. It is copied from a standard type of machine, and incorporates a micrometer head.

Non-working scale models

S. A. Walter, of Wembley Park, Middlesex, who is noted for his excellent models of guns and ordnance, exhibits a model of a 9.2 in. breech-loading gun on railway truck mounting, to a scale of ½ in. to 1 ft. This type of gun was extensively used in the last war. In use, the gun platform is lowered so that the truck body rests on the sleepers, thus providing a solid mounting, with the wheels raised to prevent damage to the track. The model was made on a 2½ in. plain lathe with the aid of home-made modifications and attachments.

A skeleton demonstration model of Stephenson valve gear in ¾ in. scale is entered by C. S. Buist, another well-known past exhibitor. This is of the type fitted to his model of a GNR single-wheeler, which appeared in last year's exhibition. It is made mainly in Perspex and enables all valve events, also the effects of linking-up and varying the timing of eccentrics, to be studied accurately and at leisure.

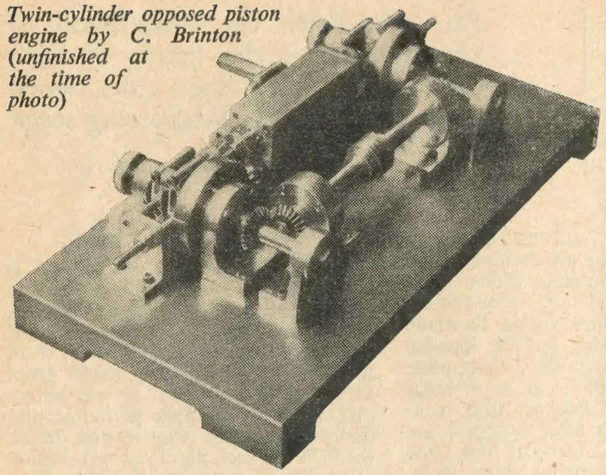
Representational models

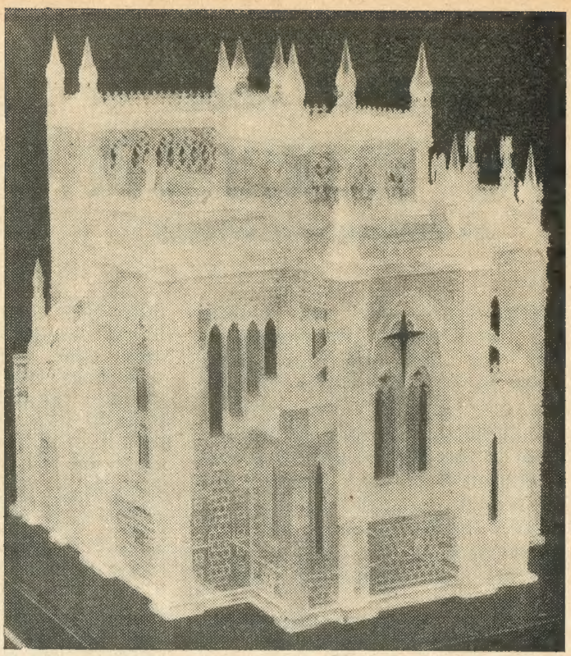
As usual, this class is rich in variety, and includes some interesting architectural models, such as the free-lance cathedral model by John Given, a plumber, of Sunningdale, Berks. This is made entirely of transparent Perspex, with very limited equipment, most of the detail carving being done with sharpened screwdrivers and bradawl. No parts are cast or moulded.

Plastic materials were used also in the construction of the 4 mm. scale bungalow by Archibald McIntosh, of Bromley, Kent—this includes even the vegetation of the surrounding grounds, though the particular material is not specified. Railway buildings include a through platform, bay and signal cabin in OO gauge by Ian D. Grant, a physician, of Wimbledon.

Inspiration for a very interesting

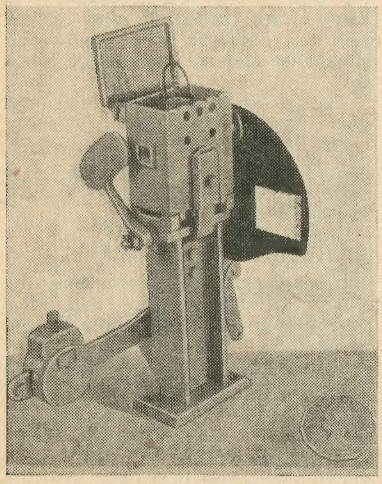
Twin-cylinder opposed piston engine by C. Brinton (unfinished at the time of photo)

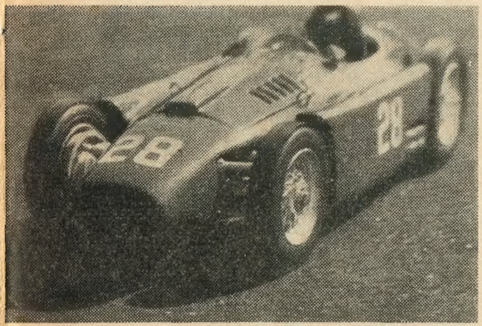




Below: *R. A. Holders' model of a ground disc signal*

Right: *A free-lance cathedral in Perspex built by John Given*





Umberto Perelli's model of a Ferrari V8 racing car

model by Lt-Comdr T. F. Richards, RN (retd) was obtained from the late Dr Nepean Longridge's book, *The Anatomy of Nelson's Ships.* It represents the *Victory's* quarter deck looking outboard on the port side, with the guns' crews in action. The guns are turned in mahogany, figures carved from boxwood, and deck planking is butt jointed.

Horological exhibits

A replica of the Shortt Free Pendulum clock, as employed at Greenwich Observatory, is entered by A. E. Bowyer-Lowe, who has exhibited some very interesting clocks in previous exhibitions. It is not possible to exhibit the complete clock, as the structure is massive and must be bolted to a solid wall, but the portion shown includes the main working parts, and enables the principles to be observed. The design is adapted from one in the Science Museum, but many parts are of original design.

The clock exhibited by T. A. Ching, a lithographer, of London, N13, is of original design and is the subject of a patent. It has three hands—revolving once in 24 hours, 2 hours and 10 minutes respectively—each of which indicates a single figure on the dial, which is divided into the 12 signs of the Zodiac. The object is to provide a better and more convenient way of sub-dividing the 24 hours of the earth's rotation than by the conventional clock dial.

Readers who have followed the articles on the ME Musical Clock will be interested to see C. B. Reeve's original prototype in the Loan Section of the Exhibition; also his chiming, striking and musical Bracket Clock. The latter is equipped with 20 tubular bells and fitted in a figured mahogany case approximately 16 in. high.

General craftsmanship

A well known past exhibitor in this section, V. H. Washer, of King's Langley, Herts., has entered a set of carvings of six military figures, inspired by *Regiments at a Glance*, by Lt-Col F. Wilson. Each model has occupied 100 hours' work, and the material employed is pine and lime wood. R. A. Holder, a mechanic, of Worthing, exhibits a Westinghouse ground disc signal to a scale of $1\frac{1}{2}$ in. to 1 ft. This is of the type used on the Southern Railway (circa 1940).

Junior class

Encouraging signs of interest in model making by the rising generation are shown in this class. Marine models are predominant, and include the waterline model of the frigate *Amethyst*, by Adrian Bomback, aged 11, which is complete with 30 depth charges and signal flags; the destroyer *Dodger* by the same exhibitor; m.v. *Rowallan Castle* in $\frac{1}{8}$ in. scale, by Roger A. Carr, of Surbiton, aged $15\frac{1}{2}$; and a miniature model of a Humber cargo vessel in 1/150 scale by D. G. Macmillan, aged 15, of Three Bridges, Sussex.

Railway models in this class include a BR lightweight diesel two-car set by E. Tedaldi, aged $14\frac{1}{2}$, of Hucclecote, Glos., and a 4 mm. scale model of Yeoveney Halt by D. R. Tomkins, aged 15, of Surbiton. ■

A WORKING MODEL OF ST NINIAN

By EDWARD BOWNESS

Part 16—With the installation of the cranes and the fitting of both forward and after deck rails, work now reaches a very interesting stage

Continued from 25 July 1957, pages 120 to 122

THE cranes may now be fixed on the model, the dimensions for their positions being given in Fig. 29 (March 21) and Fig. 63 (June 27). The centre of the crane on the forward deck is close to the edge of the crossbeam at station 8 and the centre of the 5-ton crane coincides with the after edge of the crossbeam at station 3. These must be cut away to clear the lock nuts on the pivot bolts of the cranes.

Similarly, the forward edge of the half-moon shaped plate at the stern must be cut away to clear the screw which secures the steering wheel shown in Fig. 71 (July 25).

CRANE JIB SUPPORTS

Supports are provided for each crane to which the jib is lashed when the ship is at sea. That for the crane on the forward deck is seen in the picture on page 934 (June 27). It is also shown in the plan in Fig. 63 in the same issue.

It consists of a plate set approximately at right angles to the centre line of the ship just forward of the hance of the starboard bulwark. Its outer edge is soldered to the bulwark, being cut to suit the outward slope. Below it is cut away to clear the waterway. Aft it is supported by a small gusset plate.

On its upper edge a strip of 20 s.w.g. brass is soldered, the ends being turned up and drilled to receive the cord by which the jib of the crane is secured.

The supports for the two cranes on the after shelter deck are shown in the picture reproduced on the facing page. That for the 3-ton crane will be seen at the corner of the docking bridge and the one for the 5-ton crane is at the corner of No 1 hatch. Their construction is shown clearly in the picture.

They consist of two pillars fixed to the deck, connected by a cross bar 6 in. above it. A metal plate with a stiffening bar underneath connects them at the top. The ends of the plate are turned up to locate the jib, the width being made to suit the width of the jib where it rests on the supports.

Two rods bolted to the pillars on their after sides and carried down to meet where they are secured to the deck form a bracing which deals with both lateral and fore-and-aft strains. The pillars should be made from 16 s.w.g. wire and the bracing rods from 22 s.w.g. wire. The plate across the top will be made of brass strip, as for the support first mentioned. The two after supports are higher than the forward one, the level of the plate being about 18 in. higher than the adjacent rail.

The picture provides other interesting items of information about the ship. There is a clear view of the starboard half of the docking bridge, and a very complete view of the side of the 3-ton crane and its jib. It was supplied by Herbert Morris Ltd, makers of the crane, and was obviously taken when the ship was new.

Since then the forward starboard corner of the after deck house has been painted black. I imagine that as the crane swings round the load will rub against the paint and make ugly marks on it—hence the dark paint. This will be seen in the picture on page 63 (July 11) and on others.

ROPE RACKS

Three racks are provided on which mooring ropes and other large ropes may be laid to drain after they have been in the water. Two of these are on the fore deck—one on each side of the windlass—and the other is at the stern, aft of the steering wheel. This rack, which is 6 ft wide, is shaped to fit its position (Fig. 74). It spans the base of the ensign staff, and if the 9 in. ventilator at that point is fitted, see page 65 (July 11), it must be cut away to clear that also, as is the case in the ship herself.

The two racks forward are rectangular, 6 ft long × 3 ft wide. They are made of wood and are rather like gratings but more open. They are supported clear of the deck by wooden strips across the corners (Fig. 75). The framing is about 4 in. deep × 2 in. thick.

The rack at the stern has a frame about 5 in. deep, as shown in the picture on page 65 (July 11), which shows also the slats. The racks on the forward deck may be seen in the picture on page 934 (June 27) although they are covered with ropes which obscure the details.

THE ENSIGN STAFF

The support for the ensign staff is shown in Fig. 74. It should be made from a piece of rod $\frac{3}{16}$ in. dia. × $\frac{1}{4}$ in. long drilled to fit the staff, and soldered at an angle of 15 deg. from the vertical to a base made from 18 s.w.g. sheet brass. It will be cemented on to the deck planking, and further secured by two tiny pins driven through the deck planking and slightly riveted over on the underside of the deck plate.

The staff itself is made from 14 s.w.g. brass wire $2\frac{3}{4}$ in. long, slightly tapered toward the top, and surmounted by a truck 5/32 in. dia. made from boxwood and drilled for flag halliards. A small cleat should be soldered on near its lower end.

The jackstaff is $1\frac{1}{2}$ in. high and could be made from 18 or 20 s.w.g. wire with a bead, or a blob of solder, for the truck. A hole to receive it should be drilled in the D-shaped plate at the stem head.

FITTING THE RAILS

Having practically completed the details for the forward and after shelter decks you should now be able to fit the rails. The making of the stanchions has already been described in part 10 (May 16). In that issue the type of stanchion for the shelter deck is shown in Fig. 51*A*. A portion of the flange at the base is filed away on one side until it is flush with the pillar. Care must be taken to have the flat in correct relation with the holes for the intermediate rails.

The stanchions must be soldered firmly in the corner made by the stiffening angle along the hull and the upper edge of the sheer plate, as shown in Fig. 51*A*. They should be spaced from $\frac{3}{4}$ to 1 in. apart, as detailed in part 10. This part also specifies dark walnut as the material for the rail, which should be $\frac{3}{16}$ in. wide × 3/32 in. thick.

At the stern, where the curves are particularly severe, the central portion should be made separately. The ends should be scarfed and fitted with intermediate blocks, as shown in Fig. 74. As a reinforcement the rail should have a piece of brass shim cemented on underneath.

To mark out the holes for the stanchions the completed rail should

be laid in its correct position on top of the stanchions—after they have been soldered in place and trued up, and tapped with a light hammer at each stanchion to make slight indentations. At the brass shim the positions could be scribed on, after marking them on the side of the rail.

Drill the holes in the rail so that they are a tight fit on the stanchions, using a stop to prevent the holes going right through. Adhesive should then be applied to each stanchion and at each hole, after which the rail can be tapped carefully into its final position. The intermediate rails may then be threaded through, the thickness of the wire being decided by the diameter of the holes in the stanchions.

RAILS ON FORWARD DECK

The rails at the bow are fitted flush with the D-shaped piece of brass which was soldered on top of the bulwarks, see page 354 (March 7). Before fixing them in position a strip of 22 s.w.g. brass should be soldered along the curved edge of the hances at the after end of each bulwark. That on the port side shows clearly in the picture on page 352 (March 7) and that on the starboard side in the illustration on page 934 (June 27).

These are drilled for the intermediate rails after they are soldered in position, the holes being on the inside of the bulwark plate so that the end of the rails may be secured to the plate by a spot of solder.

The rails should be carved or steamed in order that they conform exactly to the plan on the full-size drawing. It is preferable to carve them to shape, as it is impossible to secure them very firmly—and a steamed rail always has a tendency to straighten itself under certain climatic conditions.

They should be cemented along the top of the bulwark plates and to the tops of the gusset plates which strengthen them. For greater security tiny angle brackets could be screwed to the underside of the rails, the vertical member being bent to suit the slope of the bulwark and then soldered to it.

Crane on the after shelter deck with supports for the jibs

Further aft the rail will be carried on the stanchions, some of which, especially those further forward, must slope outward to suit the position of the rail. At their after ends the rails must be fitted close to the curved side of the front of the superstructure, and in line with the beading on the midships bulwarks (Figs 16 and 63). A stanchion must be placed as close as possible to the after end of each rail, and the end of the rail fixed firmly to it. The ends of the intermediate rails should be fixed with a spot of solder to the inside of the forward end of the midships bulwark.

RAILS ON AFTER DECK

My remarks on carving the rails to the correct curve apply equally to the rails for the after deck. They should be continuous from the ventilating trunks at station 2 to the scarph at the stern. At the ventilating trunks the rails should be secured by an angle bracket under the rail screwed to the side of the trunk. The intermediate rails can be pushed into holes drilled in the side of the trunk.

On the port side a similar rail with stanchions as in Fig. 51*A* (May 16) runs from the ventilating trunk to the hance of the midships bulwark, Fig. 16 (February 21) 0.7 in. aft of station 3. As already explained on page 507 (April 4) this bulwark was cut down to the level of the sheer strake on the port side. In fixing the forward end of the rail to the midships bulwark it must be remembered that the superstructure is removable, and the fixing must allow for this.

This rail must line up with the beading along the top of the midships bulwark, which, if not already fitted, should be done so now. The beading is interrupted at the doorways in the side of the midships superstructure, and the bulwark should be cut away to correspond with the lower portion of the doorways, see pages 96 and 97 (January 17). Forward the beading lines up with the forward deck rail.

On the starboard side between stations 2 and 3, above the doors for handling cattle, there is no wooden handrail, but merely an iron rail with a second rail beneath it, supported by three stanchions.

In the ship these are removable, but it would be better in a working model to have them fixed. Also, seeing that the midships superstructure is removable in the model, the upper rail should be lowered so as to line up and connect with the beading on the midships bulwark, which is a fixture.

The second rail will be lowered to

suit. Stanchions made to Fig. 51*A* could be used by cutting away the flange and peg above the upper ball and ignoring the lowest ball, which will be hidden by the extra depth of the bulwark at this point.

At each of the eight pairs of fair-leads, four forward and four aft, the second and third intermediate rails are omitted between the adjacent stanchions. Instead, a heavier bar is substituted—use 18 or 20 s.w.g. for the model—as will be seen in the picture on page 65 (July 11). In the model this should be soldered to the ends of the stool, and a touch of solder might be placed between the bar and the central ball of the stanchion at each side.

On referring to part 6 (March 21) I find that no specific instructions were given for the handrail around the hatches on the after shelter deck. These are made removable for convenience in handling cargo, and are not joined at the corners, as will be seen from the illustration in this instalment. However, for a working model I think they should be fixed and joined at the corners, as being both stronger and neater—and less complicated.

The stanchions will be made to drawing 51*D* (May 16), the lower ends being driven into holes in the wooden rails around the hatches, and the handrails driven on to the pegs on the top of the stanchions, a suitable adhesive being used throughout. The spacing of the stanchions can be judged from those in the picture.

The handrails on the docking bridge on the top of the after deck-house are carried on stanchions 51*B* (May 16). The flange is filed away as described for the stanchions around the shelter deck, after which they are soldered to the outside of the angle iron which surrounds the docking bridge. Their positions and spacing are shown in Fig. 35 (April 4).

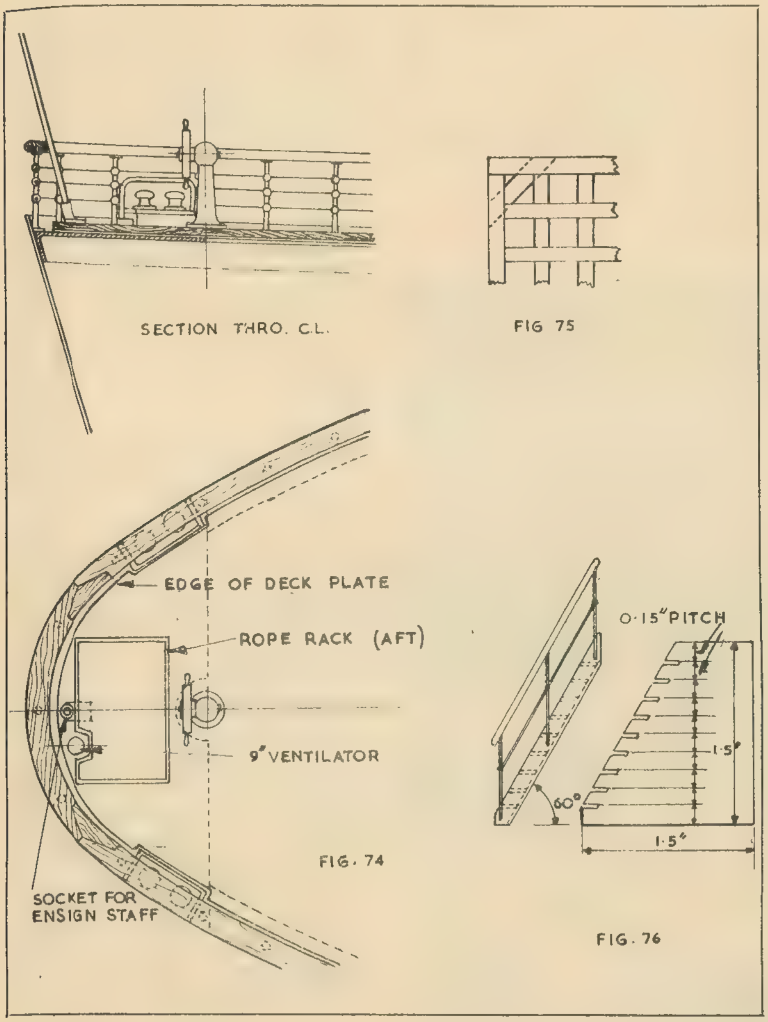


Fig. 74: Shelter deck at stern showing rails, rope rack and other details. Fig. 75: Corner of forward rope racks showing support (not to scale). Fig. 76: Ladder and jig for assembly

MAKING LADDERS

The ladder leading from the docking bridge to the shelter deck is shown in the illustration on page 505 (April 4). There are a number of similar ladders about the ship, and it is advisable to make a jig for assembling them. In the ship they have dark wooden sides and handrails so for the model they should be made of wood, possibly mahogany veneer for the steps and sides. If, however, it is preferred to work in tinplate there is no objection, providing all is suitably painted.

The height from one deck to another is 7 ft 6 in., and the ladders are at an angle of 60 deg. to the horizontal. The jig should be made from a piece of wood $1\frac{1}{2}$ in. square × $\frac{3}{8}$ in. thick, hardwood for preference so that the pieces between the slots will not break out. Slots should be cut out (Fig. 76).

For the steps a strip $\frac{1}{8}$ in. wide should be made and cut off in $\frac{1}{2}$ in. lengths. These are inserted in the slots and the ends rubbed on a piece of fine sandpaper until they are all level with one another, the opposite ends being kept flush by a piece of wood held against the jig. The process should then be reversed to ensure that both ends are flush.

The side pieces should be made next. They are $1\frac{3}{4}$ in. long × 5/32 in. wide. The ends of the steps, which project slightly on each side of the jig, should then be touched with adhesive, and the side pieces laid on and clamped in position until the adhesive sets.

To prevent the ladder being glued to the jig it should be moved from side to side in the jig after the sides are clamped on. When set the ladder should be removed from the jig, and a strip of veneer glued on the back, between the side pieces. If this is coated with adhesive on its inner surface it will adhere to the steps and add greatly to the strength of the ladder.

The pillars or stanchions, which are of 22 s.w.g. wire, should be glued to the sides, and the handrails stuck on top—small holes having been drilled in the rail for this purpose. The intermediate rail is of the finest wire, and may be secured by adhesive.

● *To be continued*

PISTON REMOVAL and FITTING

BEGINNER'S WORKSHOP

By GEOMETER

THE main proportions and, to some extent, the minor details of an in-line multi-cylinder engine influence the manner of dismantling and assembling when pistons have to be removed for fitting new rings or attention to small end bearings.

The bore-stroke ratio, the spacing of the cylinders, the clearance in the crankcase, the length of the connecting rods and the diameter of the crankpins may be regarded as some of the main proportions reacting on one another and affecting the issue; while details are the type of location chosen for gudgeon pins, and the jointing angle of the big-end caps.

In a major overhaul, as in original assembling, there is hardly likely to be a problem. On most engines, dismantling can be arranged for accessories to be cleared to the point where crankshaft, connecting rods and pistons remain in the block. Then the main bearing and big-end caps can be removed. the crankshaft lifted out, and the connecting rods and pistons drawn. Naturally, when assembling, the reverse order is followed.

When, however, only partial dismantling is envisaged, there can be the following possibilities according to design and details: (1) on a separate (cylinder) block engine, this can be removed complete with pistons and connecting rods; (2) on a wet sleeve engine, each sleeve can be drawn complete with piston and connecting rod. On engines with cylinders and crankcase forming a single component; (3) pistons and connecting rods can be removed downwards; (4) pistons and connecting rods can be removed upwards; (5) pistons can be removed upwards, connecting rods downwards; (6) neither pistons nor connecting rods can be removed, but rings can be taken off and fitted from the top.

Given clearance in the crankcase and sufficient distance between crankshaft and base of cylinders, pistons can be removed and fitted from below. On engines with restricted space, it may be necessary to position the crankwebs horizontally; or, having drawn a piston out of the cylinder, it may in some instances be placed in the crankwebs and the crankshaft turned to bring it out.

When this is not possible, and the big-end will not pass through the bore, the assemblies can sometimes be pushed upwards, and the gudgeon pins taken out—which usually demands gudgeon pins located by endwads and circlips. Then, when assembling, a taper mandrel, as at *A*, pushed through first, facilitates entering the gudgeon pins.

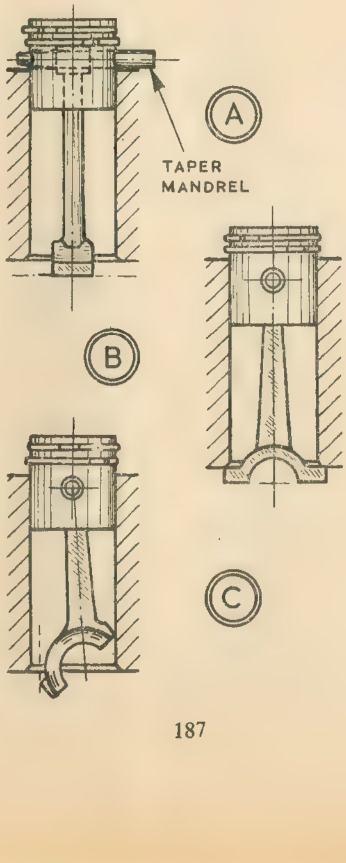
When assemblies cannot be removed upwards or downwards, and gudgeon pins cannot be removed, pistons and connecting rods can be pushed upwards for rings to be removed and fitted, as at *B*. Cleaning can be effected by wiping the pistons, one end pushed out at the top, the other end pulled out at the bottom. Rings can, of course, be checked for gap clearance with the pistons down in the cylinders. Usually all rings on such pistons are above the gudgeon pins.

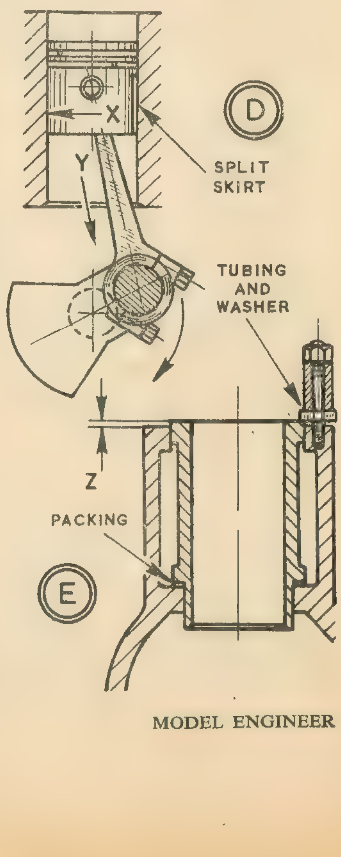
For scraping out a wear ridge, the piston should be slightly down the cylinder, a disc of paper laid on top, and this sealed with grease. The ridge having been removed, the chips must be wiped out, the grease and paper removed, then the piston pushed further down for the cylinder to be wiped.

On short-stroke engines of older type with somewhat slender crankshafts, relatively large bores may permit big-ends to pass through; and on modern engines employing crankshafts with mainshafts and crank pins of large diameter, angle-jointed big-ends serve the same purpose—as at *C*.

Split skirt pistons are always fitted for the thrust on power strokes to be taken on the solid side, as at *D*, *X*; while on angle-jointed connecting rods, the thrust is usually taken as at *Y*; but this is not invariable, some rods fitting the other way round.

Wet sleeves not to be removed should each be held down by a device like tubing and a washer, as at *E*, to avoid disturbing the packing, which could lead to water leaks; and to be firm, each sleeve must project as *Z* 0.003 in. to 0.005 in. above the block face. ■





ROCHDALE STEAM ENGINES

G. WATKINS discusses some famous engines developed for the mills of the North Country

THE connection of the steam engine with the Industrial Revolution is too well known to need review, and it was natural that, with the demand for engines everywhere, local production was developed rapidly when Watt's patent right expired. This was so, particularly in the textile areas, and the migration southwards of many Scottish mechanics gave great impetus to the founding of small mechanics shops wherever there were mills.

This was so in Rochdale area, and over the years several firms and small engineering shops built steam engines and boilers; but most of these early products disappeared when the mills were modernised as the trade developed. In later years, particularly over the years 1880-1910, many fine engines were built in the town by John Petrie and Co., and J. and W. McNaught, whose Scots origin is evident in the names.

Throughout Lancashire, steam engine design tended to follow specific local trends, and this was so in Rochdale where, although Thos Robinson and the smaller shops followed usual practice, both Petrie and McNaught developed a local trend in design. The notable feature was the use of piston valves for the cylinders of large horizontal steam engines, particularly for the low-pressure ones.

This was rarely done elsewhere for mill engines, though such valves were widely used for rolling and marine engines. Later, of course, Corliss, and drop valves were much used, particularly for high-pressure cylinders, but even then piston valves were in general use for the low-pressure ones. Petrie used piston valves with internal governor controlled cut-off valves on many high-pressure cylinders, too.

The twin tandem

Another local trend was the almost exclusive use of the horizontal twin tandem design for large mill engines, including the double compound and the four-cylinder triple-expansion. The cross compound horizontal, so widely used in all other areas, was little built locally, certainly not by Petrie, nor McNaught. The marine type, again met everywhere else, was not built to any extent at Rochdale, and it appears that Petrie built only three, and McNaught one or possibly two of the vertical type for large powers. It should be emphasised here that these notes refer to the large high power units that gave such fine service in spinning mills, small power engines, say, up to 100 h.p., being generally similar in design everywhere.

So much for design trends; now for a few examples.

The beam engine was a standard type in the early days, and Petrie built many of them. They soon settled to a sound standard design, having single or twin cylinders, heavy cruciform cast-iron connecting rods, and usually two fluted cast-iron columns to support each beam. Broadly, this was their standard for some 40 years. It was sturdy, simple, and reliable, and could be depended upon to keep the mill turning, and with the low-steam pressures then used it was economical. Some of them worked for nearly a century, a tribute to the sound work put into them.

Carpet in engine room

Fig. 1 is of the engine at Whitelees Mill, at Littleborough, taken in 1937, after nearly a century at work. It is a typical Petrie beam engine. The steam cylinder design, as seen in Fig. 2, was certainly characteristic. It has separate valves for the top and bottom ends, with the valve chests connected by two fluted cast-iron columns which formed the steam and exhaust pipes for the upper end of the cylinder. The valve rod from the eccentric rocking shaft entered the valve chest from below the floor, so that the piston rod gland was the main one in the engine room.

This, in the days of inferior gland packings, did much to keep the engine room clean, reminding us that often the mill owner, who was usually his own manager and lived nearby, was as keen on his engine as he was on his mill. The engine room was often a show piece, and at least one magnificent engine had carpeted stairs with marble grained columns. The earlier mills were usually built of stone, with engine room walls being plastered and often decorated with painted motifs, moulding, except for wooden panels, not being much used.

The Whitelees engine developed about 125 h.p. with a cylinder of 25½ in. bore and 5 ft stroke, the speed being 34 r.p.m. It remained virtually unaltered throughout its long working life, but various boiler changes brought increases in working pressure.

Many Petrie beam engines were altered later, as the power demand grew, usually by "McNaughting" them; that is, by adding a high-pressure cylinder, which was placed between the connecting rod and the main supporting columns. This practice was patented in 1845 by W. McNaught, of Glasgow, a cousin, and it was soon widely adopted. It was a good method, since beside increasing the engine power considerably with a minimum of structural alteration, it reduced the stress about the beam centres. Since higher steam pressure was required, it was economical, too.

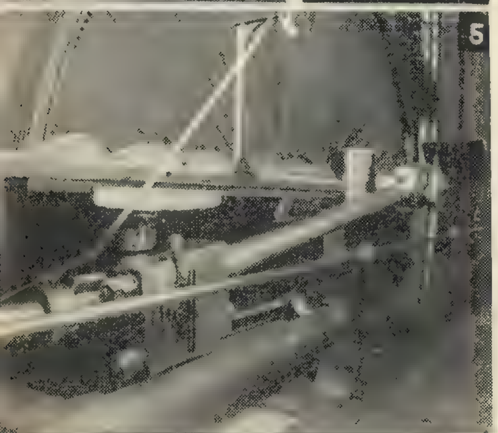
Fig. 3 is of a plant so treated. This was installed in Leicester by Petrie in 1861, and then was of 80 h.p. rating. It had two cylinders, very similar to Fig. 2, each of 34 in. bore and 6 ft stroke, and each engine was named in keeping with tradition—in this case, *Jupiter* and *Juno*. This was followed in 1877 by what was always known as the "New" engine, identical with the other, but having a single cylinder and rated at 40 h.p.

These engines were low-pressure condensers—using steam of 40 p.s.i.—for many years, until 1896 in fact, when Petrie fitted a high-pressure cylinder of 24 in. bore and 3 ft stroke between each crank and the columns. These high-pressure cylinders were typical of Petrie's later practice, as they were fitted with piston valves, having twist cut-off motion.

Modernised

Although they were so much later than that of Fig. 1, their speed, at 33½ r.p.m., was not changed. There was one difference, in that, while the Whitelees engine drove by two pinions geared into the toothed rim of the flywheel, the Leicester ones drove by a spur ring on the flywheel arms. Modernised in this way, and fitted with boilers carrying 90 p.s.i., these engines developed over 750 h.p. and continued to work with every satisfaction for over 50 years.

It is notable that, as early as 1845, Petrie built a much more powerful



Petrie engines were made to last a lifetime. The fine craftsmanship and robust engineering that went into their making is clearly evident in the several classes of Petrie stationary engine illustrated on this page

ROCHDALE STEAM ENGINES . .

set of beam engines for one of Brights Rochdale mills. This was rated at 120 h.p., the cylinders having 8 ft stroke, actually indicating about 700, and it was this superb showpiece which had the carpeted stairs and grained columns. A similar engine was sent to Russia in 1847.

So much then for Petrie's beam engines. Little enough, when we consider how much they did to develop the textile trade, but the firm was progressive, so that when the horizontal engine became a competitor to the beam, they began to build these, too, and again soon settled to a standard type.

This was a tandem, usually with two cranks, each with its own pair of cylinders. Although they built smaller engines with single cylinders and flat slide valves, I have never seen one. In fact the smallest seen in later years was a single crank tandem of some 150 h.p., which was fitted with piston valves to both cylinders. Built about 1875, it was, after some 30 years' work, removed to another mill to replace a beam engine, and gave every satisfaction for many years more.

This, as no doubt many others of their earlier horizontals, was fitted with four bar guides for the crosshead, while the later and finest ones had trunk frames fitted with adjustable slides, and with cross ribs on the trunk. Notable, too, in these later engines, was the practice of driving the condenser air pump by a diagonal connecting rod and a beam below the floor. Another distinctive feature was the use of the Dowell cut-off gear. This was typical Petrie, being substantial and well finished, with neat forged parts for the cut-off motion.

Early piston valves

Fig. 4 shows a set, and it will be noted that it is operated off one vertical camshaft driven from below. Fig. 5 illustrates a typical Petrie trunk frame, with the cross ribs, the diagonal connecting rod for the air-pump drive off the crank pin and, less distinctly, the fine brass nameplate fitted inside the frame.

A twin tandem built about 1890 is shown in Fig. 6. This had piston valves throughout when built, the Corliss high-pressure cylinders being fitted later. Since it was a double compound, there were two high-pressure cylinders, each of 24 in. bore, fitted with Corliss valves, as seen in Fig. 4, and there is every probability that the Dowell gear was that originally used for the piston valve high-pressure cylinders and retained for the newer ones.

The two low-pressures, each of 45 in. bore, were fitted with plain piston valves, and the stroke was 6 ft. It developed some 1,800 h.p. at 50 r.p.m. The flywheel was 30 ft dia., and it was a magnificent piece of engineering in every way. It remained in service for over 60 years.

Fig. 7 is of a triple expansion built about 1894. It is most interesting in having piston valves, even upon the high-pressure cylinder. Designed to develop 1,800 h.p., the high-pressure cylinder seen on the left was 23 in. bore and was fitted with internal twist cut-off piston valve, with the Dowell trip gear under governor control.

The inter-pressure on the right was similar, but with the Dowell gear under manual control, and with 37 in. bore. The two low-pressures, next to the cranks, were each of 40 in. bore with plain twist motion piston valves. Running at 57 r.p.m. its power was delivered through the 24 ft dia. flywheel by 36 ropes.

Another triple expansion is illustrated in Fig. 8. This probably represents the latest development of the pure Petrie horizontal, as it was built with Corliss valves on the high and intermediate pressure cylinders, operated by Dowell cut-off motion, as in the previous case.

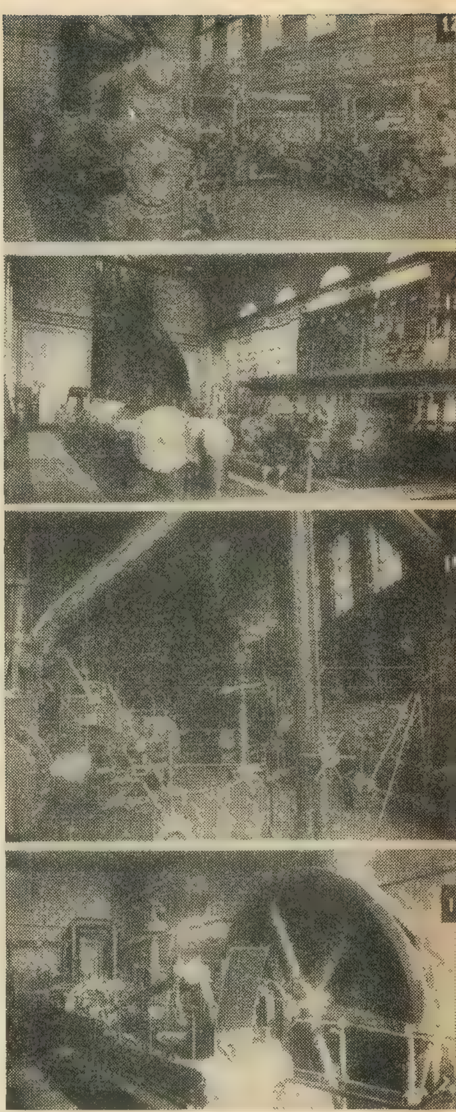
Boilers lasted 54 years

The high and intermediate were 24 and 36 in. bore, each low-pressure being 42 in. The stroke was 5 ft. It differed in having the air pumps at the rear, driven off piston tail rods; unusual, indeed, for Petries. A further tribute to Petrie's sound workmanship was seen here—this time in boilermaking—since the original four Petrie 30 ft × 8 ft Lancashire boilers still worked at their original 160 p.s.i. at the age of 54.

Later, moving with the times, they radically changed the design and (Fig. 9) incorporated many Continental features. It was, in fact, produced by a Swiss named Neukomm. It was still the horizontal tandem, but fitted with drop valves, and it was efficient.

Some twin crank examples of this type were built, and at least one single crank type, which gave typical Petrie service. That in Fig. 9 had two 19 in. bore high-pressure cylinders, the low-pressures being 34 in. with 4 ft stroke, and it is a pity that more were not built as they gave good service.

These later engines had two variations to the older Petrie, in that they had the makers' name cast upon the bedplate, sometimes with the date,



A notable example of McNaught's work is the triple-expansion four-cylinder engine shown in Fig. 13. The Corliss valve gear can be seen on the right of the picture

in contrast to the fine brass plates fitted to the earlier ones. Moreover, the practice of driving the air pump off the crank pin was abandoned, and the trunk frame was replaced by a flat bed with slipper guide and the Dowell gear by one more compact.

So we see that they used the tandem design as long as they built engines and I have met with only one cross compound of their make, seen in Fig. 10. Named *Progress*, it was built in 1909, having a Corliss high-pressure cylinder of 15½ in. bore,

the low-pressure, of 30 in. bore, having a plain piston valve. The condenser was behind the low-pressure cylinder with the air pump tandem to it.

Staunch though they were to the horizontal tandem, they did make three vertical spinning mill engines. All are now gone. The first one was built for the Marland mill at Rochdale in 1905 and would be running today but for a lamentable smash. That for the Linnet mill was dismantled for export when the mill was closed, and went down with the vessel. The other went to the Crest mill at Rochdale, and is seen in Fig. 11. It was built in 1907 to develop 1,800 h.p., using steam at 190 p.s.i. The high-pressure cylinder was 21 in. bore, with Corliss valves, and the intermediate, of 34, and the low-pressure, 56 in. bore, had plain piston valves, without twist motion. The stroke was 4 ft, a notable feature being that the high-pressure cylinder had a half crank only; rare in a vertical triple mill engine. It was only recently dismantled as the mill is closed.

So much then for Petries as engine builders, a story of sound design, good workmanship, and that real craftsmanship which in a comparatively small shop combined to turn out work equal to any.

Of John and William McNaught's engines I have less to write.

William, senior, had been John Petrie's right-hand man, but in 1860 he set up on his own, mainly on repairs at first, subsequently building the smaller types of engine. He retired in 1870 and his sons John and

A McNaught vertical. This was built in 1907 *and developed* 1,700 *h.p. at a pressure of* 180

William began building horizontal engines. Being later than Petries they do not appear to have built beam engines.

Following the local trend, which was probably William senior's own speciality, they used piston valves extensively, while, with one exception, every one of their engines I have seen was a horizontal tandem, mainly with two cranks. They sometimes departed from tradition by fitting flat slide valves to the low-pressure cylinder, for smaller powers, and at least one had slide valves on both cylinders.

In contrast to Petrie, however, was the almost exclusive use of twin slipper guides for the crosshead, from which the air pump was driven. The design was straightforward, and Fig. 12 is a typical double compound. It was built in 1901 to develop 1,600 h.p. at 68 r.p.m., using steam at 150 p.s.i. and driving through 42 cotton ropes. The two Corliss high-pressure cylinders were each 21¾ in. bore, with piston valve, low-pressures of 44 in. bore and 5 ft stroke.

The Corliss valve gear was interesting for its twin triangular wrist plates, with the dashpots beneath the floor, but the piston valves were typical Rochdale with twist motion.

Four-cylinder triple expansion

Fig. 13 is another superb example of their work, a four-cylinder triple-expansion, which was built in 1900. It developed 1,800 h.p. at 67 r.p.m. with 180 p.s.i. The high-pressure cylinder was 24 in. bore, its Corliss valve gear being different to the last example in having no wrist plates. The intermediate was 38 in. bore, fitted with a twist motion piston valve, the two 42 in. low-pressures having plain piston valves.

The twin tandem (Fig. 14) is a double compound with a slight difference in that its original high-pressure cylinders, built for 100 p.s.i., were later replaced by ones fitted with McNaught's drop piston valve design about 1912. This, as can be seen at the left-hand side of the photograph, was notable for the fact that the exhaust valves worked horizontally across the cylinder, whereas most of this type had them beneath it.

The design was very quiet in operation, as the sliding piston valves, travelling over the seat, had none of the clatter inevitable to the seated type. All the motion was above the floor, and it was highly efficient, as the clearance volume was very small. This was a powerful engine, something over 2,000 h.p., since the two high-pressure cylinders were each 26 in. bore and the low-pressures 46 in., with 6 ft stroke. Here again the low-pressures had piston valves, but not all their engines were so.

It has been noted that they sometimes used flat slide valves, and Fig. 15 is an example, built about 1898. It worked with a quietness and lack of fuss that was most impressive. The Rider cut-off valve fitted to the high-pressure cylinder was unusual in a textile mill engine as, too, was the use of a large eccentric to drive the air pump. In its quiet way, it was as attractive as their large mill engines.

A vertical

So the tale of McNaughts is nearly told, as far as those types are concerned, but it was my privilege to see one of their verticals.

This is seen in Fig. 16. It was built in 1907 to develop 1,700 h.p. at 75 r.p.m., with steam at 180 p.s.i. The cylinders were 25, 38 and 60 in. bore, with 4 ft stroke. It differed from Petrie's vertical in having Corliss valves fitted to both high and intermediate pressure cylinders, retaining the Rochdale touch with a massive piston valve for the low-pressure. The 47-ton flywheel was grooved for 40 ropes and was 22 ft dia.

A feature not met elsewhere was that the slip-guides for the crossheads were separate castings bolted to the standards, instead of being cast with them. It seems probable that they built a similar engine for the Dart mill, but none now remains.

The Arrow mill was originally spaced for 115,000 spindles of 60-80 count, having some five acres of floor space, and today it seems incredible that the first brick was laid on 9 January 1907. Yet the mill was built, including the complete power plant and machinery, and the first cotton actually spun on 8 March 1908.

One regrets that so many fine engines have gone, as they were equal to any other prime mover. Rochdale can view its part in the textile trade with great pride. No more of the magnificent steam engines will be built, but the traditional sound design and craftsmanship and, happily, too, the celebrated names of Petrie and McNaught are as much in evidence as ever in their special machinery for the textile trade. ■

BELT DRIVES

Belt Drives in the Small Workshop by Duplex is a small useful book dealing with light transmission belts in all forms suitable for small power. It costs 3s. 6d. plus 3d. postage if ordered from the publishers, Percival Marshall and Co. Ltd, 19-20 Noel Street, London, W1 (USA and Canada $1.00).

STREAMLINING LITTLE JOHN

The job's the thing!—that's J. NIXON'S motto. To help eliminate boring routine he's put into practice a few "Alterations and Additions." He'd like you to share them . . .

In the administrative centre of any ship in the Royal Navy there exists a file, which on its folder bears the title "Alterations and Additions," usually abbreviated to A and As.

The documents within its covers are mainly emanations from "My Lords of the Admiralty," and they start to accumulate from the moment the ship is conceived; the subject matter, as the title conveys, consists of modifications and new ideas, which are designed to produce a more efficient and seaworthy fighting unit. Nothing in this file necessarily implies that the original ideas or designs were basically wrong in conception—only that nothing is static and nothing so good that it cannot be improved upon.

Had I been a vain type I might have been tempted to head this contribution "Improvements to a 5 in. Little John lathe," but any such vagrant thought was arrested by a feeling that, in so doing, I would have been casting a reflection on a very efficient machine.

I may even *feel* that some of the items I shall mention *are* improvements—that is purely a personal opinion. But I hasten to add that none of the A and As mentioned improves the high quality of the work turned out by this lathe—only that most of them have added to the facility of its production.

Moreover, certain of the items are altogether normal accessories which one either buys or makes when a new machine is added to the workshop; they are included here for the reason that designs and dimensions may give others an indication of the shape and size of something which has proved satisfactory.

The cynical may say of the notions which I am about to describe, "Well, what's the hurry? Modelling is for fun, and production does not enter into it." But there is no fun, or virtue for that matter, in pursuing a boring routine. Progress aims at the elimination—and eventually achieves a reduction at least—of needless chores. The job's the thing!

SLIDE RESTS AND TOOL POSTS

Order of importance is not easy to assess, but slide rests and tool posts stand high on the list.

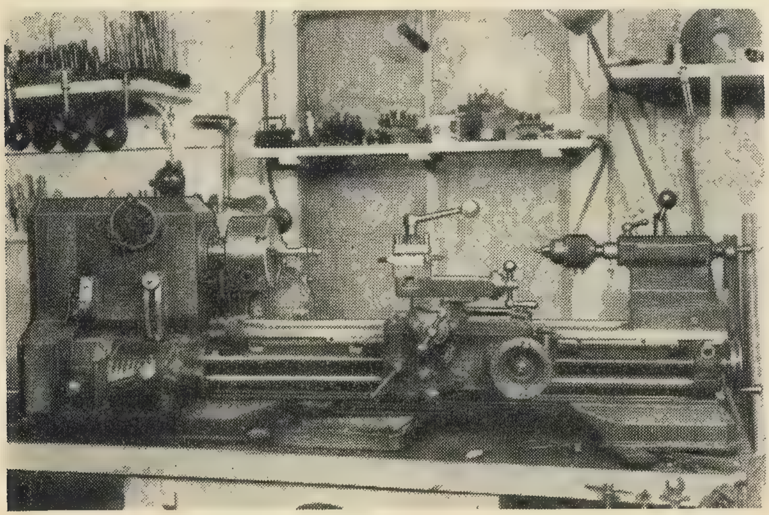
The standard post, on the lines of the Boley tool post, is secured to the top slide by a $\frac{3}{8}$ in. T-bolt fitted with a $\frac{5}{16}$ in. nut bored out. The tool is clamped in position by two $\frac{5}{16}$ in. square-headed steel setscrews.

Drilled through the post parallel to the tool gab is a $\frac{3}{8}$ in. hole, the purpose of which remains a little obscure—to me, at least. However, it is fair to presume that is is intended for mounting a boring tool as it, too, is fitted with a pair of $\frac{5}{16}$ in. setscrews. I have yet to puzzle out the method of adjusting the boring tool for height.

The top slide, of course, swivels; it was originally secured by two $\frac{5}{16}$ in. Allen grubscrews positioned at an angle to the centre line of the slide. The implications of this set up will become clearer when one considers the operations normal to these parts.

To change a tool, say, r.h. knife to l.h. knife, necessitates slacking off the setscrews with a square socket-key, slacking off the tool post nut to alter the set, and if, in addition, one wishes to angle the slide rest for taper work, slacking off the grubscrews with an Allen key. The back grubscrew is blind from the front of the lathe and fitting an Allen key into a blind socket set at an angle—maybe in the presence of swarf—is not conducive to streamlined operations or to angelic temper!

The simplification of this unduly complicated set up is beautifully easy: exchange the offending grubscrews in the swivel lock for the $\frac{5}{16}$ in. setscrews in the boring tool position, and then it becomes possible to change tools and/or swivel the top rest by the use of a single key. I remain resigned to the presence of the grubs in the boring toolholder—at least, they keep the holes clear of chips.



Little John—most of the bits and pieces referred to in the text are visible

TOOL-POST CLAMP HANDLE

There remains the question of positioning the tool post. This took a little longer, but the solution, in this case a clamping handle, was every bit as successful. Fig. 1, which gives the particulars of this addition, is included for the sake of context.

In point of fact the clamping handle, if nicely finished and polished, can add lustre to the overall appearance of the machine; mine sports an ivory knob, turned down from a battle-scarred old billiard ball, which has a

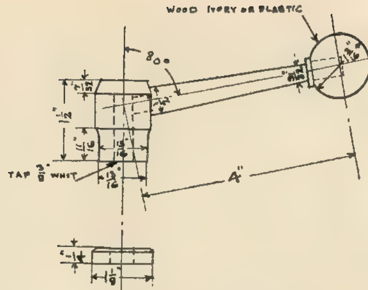


FIG. 1. CLAMPING HANDLE.

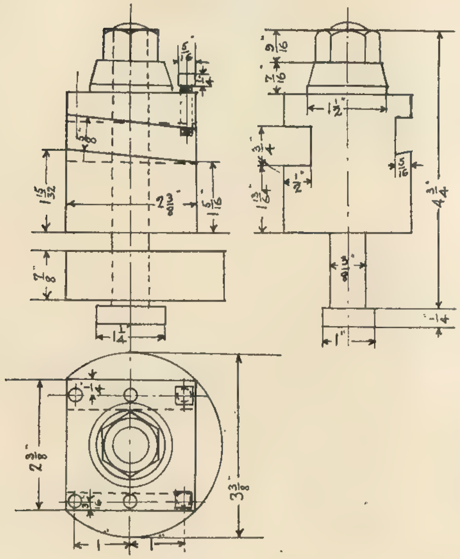
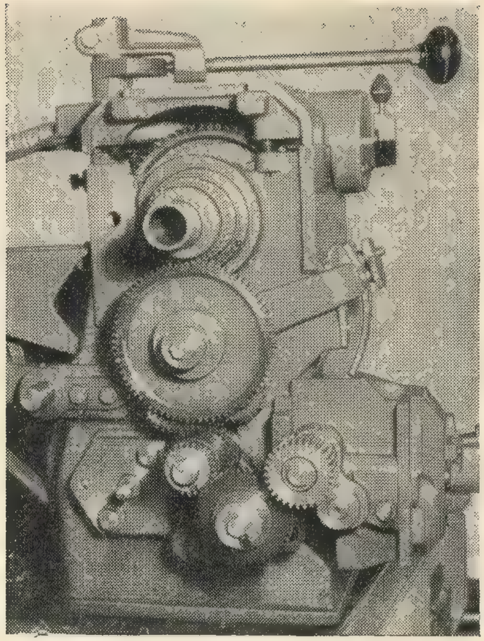
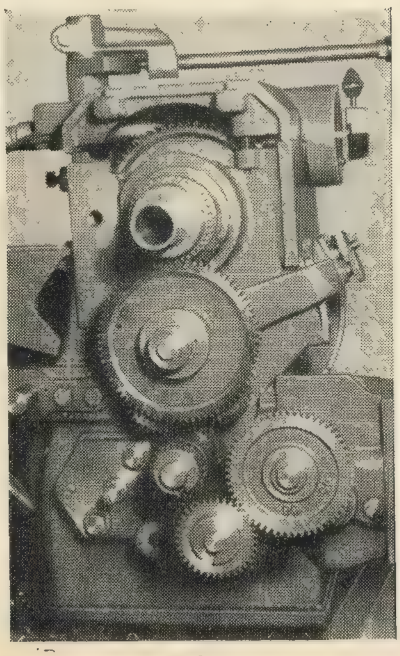


FIG. 2. BACK TOOL POST.



Top: The standard fine-feed gear train and, below, the modified gear train for extra fine feed



pleasant warm feel to the hand on cold days !

It does not need much imagination to assess the saving in time and temper these almost insignificant modifications have made to tool setting.

The standard tool post is quite sturdy, but, ignoring the doubtful value of the cross-hole, it will only hold one tool at a time, which bald fact naturally leads one to consideration of the multiple toolholder. I maintain a battery of four-way tool posts on a shelf behind the lathe, where I can select one by reaching out an arm, and the substitution of one for another is almost a matter of seconds.

It may be thought that this is carrying a good thing too far. But—I repeat—the job's the thing; and what could be more wasteful of time than endlessly changing tools ? One four-way post is an advance; several four-way posts is just carrying the idea to a logical conclusion.

This type of post in its simplest form need not be expensive; neither is it difficult to make. Good, sturdy designs have been shown so recently in MODEL ENGINEER that I shall not repeat them here.

One of my tool posts is fitted for steel—that is, normally, r.h. and l.h. side tools, front roughing and parting. Another is fitted for brass, a double-angled chamfering tool taking the place of the roughing tool. A third is set up for ivory and hard woods, and a fourth for cast iron. Heavy armament is represented by a very solid back tool post. There is little novelty in its design, but as it fits Little John a dimensioned drawing (Fig. 2) may be helpful.

Finally, in my opinion there is nothing to touch the Norman tool post for adaptability, particularly for light, variable kinds of work. Fig. 3 shows such a post as fitted to the 3½ in. Drummonds of thirty years ago, but with a means of fine adjustment for height, which was not fitted by the makers in those days; this is invaluable when setting up small boring tools in particular, such as those described in a recent article, where adjustment for height is often a matter of expediency rather than, simply, lathe centre height. The pillar fitting shown with it is an adaptor to suit Little John's top-slide rest (Fig 4).

With the exception of the Norman post, all the others have certain features in common; each has a spacing washer at the top which ensures that the clamping handle tightens in approximately the same convenient position—that is 45 deg. in front of the centre line and trailing

STREAMLINING LITTLE JOHN . . .

towards the tail-stock All, too, are fitted with tool-clamping screws having similar square heads so that the same socket key will fit any of them.

As a consequence of this galaxy of pre-set tools, the standard post has been relegated to the position of odd-job man, although it, too, conforms to the quick change rule in respect to clamping. It comes into service when a tool not included in the four-way posts, such a heavy boring tool, is indicated.

HEAVY SLIDE REST

For heavy roughing and parting off a back tool post is almost an essential with this lathe. It is a powerful machine and by using its power and variable speed facilities, in conjunction with high-speed tools, to the best advantage surplus metal can be ploughed off with almost ludicrous ease. But it would be unfair to expect the top slide to withstand all this power, particularly as it is not possible to mount a back tool post on it; therefore, a heavy cross slide is a necessary addition if you wish to get the maximum out of the lathe.

A design for a suitable slide rest is shown in Fig. 5. Quite obviously a casting is required, but it is simple to the point of austerity and all the machining necessary for its production can be carried out on the lathe itself and a 7 in. shaper.

In theory these operations are quite straightforward, but a practical difficulty does arise in dealing with the T-slots. They can be cored out in the casting, but the objection is that the slots harbour a good deal of sand as as well as surface scale which is "hell on wheels" to the average shaper tool; it is not easy to take a cut which will penetrate the skin all the way across the slot.

The important part of the slot is the neck, of course, and machining can be restricted to these surfaces, which are quite accessible to a heavy planing tool; the T-head of the slot can be dressed by using a $\frac{1}{4}$ in. square file. The file will not be of much use for anything else at the end of the operation but it is worth it—in fact it is worth sacrificing a not-so-new file to break up the scale and remove the embedded sand on all surfaces which

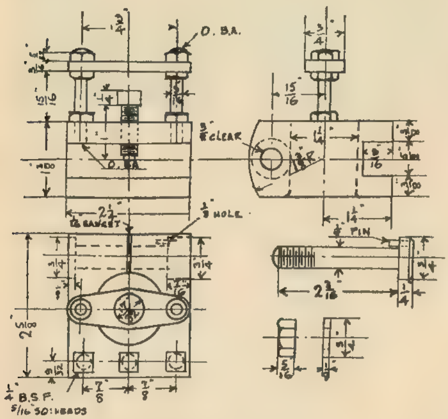


FIG 3. NORMAN TOOL POST.

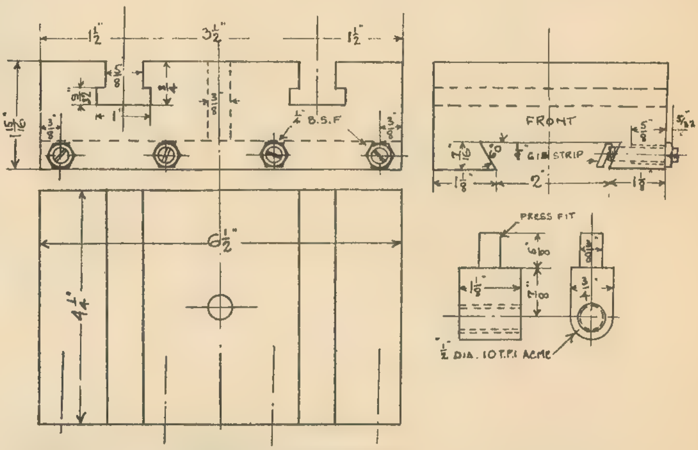
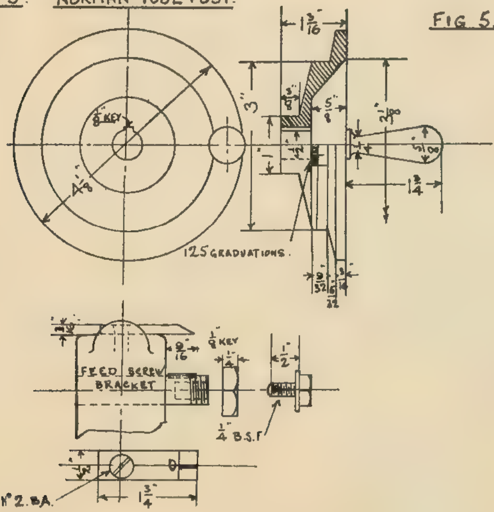


FIG 5. HEAVY SLIDE REST.



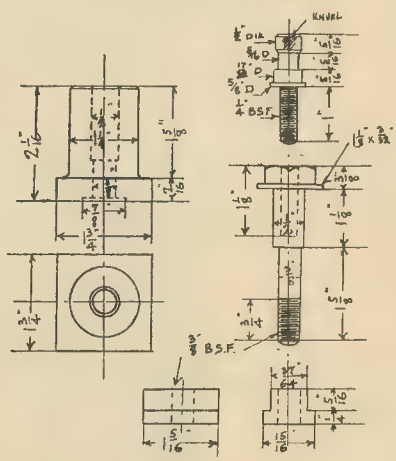


FIG.4. ADAPTOR FOR NORMAN TOOLPOST.

FIG.6. FEED SCREW HANDWHEEL & INDEX.

have to be machined, for there are times when it is not possible to hold work tightly enough to enable cuts which will undercut the whole surface in one pass to be taken.

Of course, it is not absolutely essential to machine the necks of the slots, but it is very desirable to have them square and true so that mountings like angle plates and, in particular, vertical slides can be set up with a minimum of adjustment.

The alternative to cored slots is to have the slide cast solid in the first place, and to carve out the slots by drilling and milling—a lot of work which requires patience, but, perhaps in the long run, less destructive of tools and temper than the first alternative.

There is nothing particularly difficult in making the nut, but the greatest care in setting up should be exercised in order to attain the accuracy which is necessary in this part.

THE LEAD SCREW

I have always been accustomed to having a hand wheel on the lead screws of my lathes, and the absence of one on Little John imposed a sensation of vacuum. I am fully aware of all the arguments against the use of the lead screw for traversing, if it can be avoided, and, to be quite frank, I am in full agreement with them. All the same I consider the lead screw to be the most precise method of measuring lengths and penetrations.

When boring a blind hole, for instance, penetration by means of the lead screw on the initial cut immediately establishes the exact depth desired; thereafter, the tool can be traversed by means of the top slide, or by racking the saddle up to a stop on the bed. Often, in fact, the need arises for accurate spacing beyond the limited capacity of the top slide which is fitted with a micrometer index.

The need again arises when the top slide has to be replaced by the heavy cross slide. Therefore, without further justification or apology, an indexed hand wheel for the lead screw !

In the event this is not quite so easy as might appear at first glance. At the tail-stock end the lead screw, as well as the separate feed shaft, is supported by a bracket bearing, the lead screw being kept in adjustment by a pair of thin locking nuts. The length of shaft protruding beyond the bracket is no more than ⅜ in.—not overmuch margin for fitting a hand wheel and securing nut.

You may decide that the small operations entailed, to wit, cutting a ⅛ in. keyway and drilling and tapping the end of the lead screw, can be done without disturbing the latter; I preferred to remove it although doing so meant that the Norton gearbox and the apron had to be removed. This would not be a difficult operation were it not that certain locating dowels have to be winkled out of their holes, a process requiring some little patience.

For the hand wheel a casting is indicated. Size is not of critical importance within, of course, certain limits. It is astonishing the number of useful articles which can be unearthed in a junk yard, so before you rush off to the nearest foundry, give your favourite scrap dealer a chance to supply something which can be adapted to the present requirement. Of course, alloy is preferable, but don't refuse a reasonable alternative in cast iron.

As may be gathered from a glance at Fig. 6 little further comment is necessary so far as the making of the parts is concerned. The index "finger" is seated in a closely fitting recess cut for it on the top of the bearing bracket, and is secured in place by a single screw.

As the lead screw is 8 t.p.i. the index on the wheel requires 125 divisions to give readings to 1/1000 in. Now there is no lazy way of marking off 125 divisions; you will require the help of some sort of dividing apparatus, or else be fortunate enough to be acquainted with a man who knows somebody who possesses one. Once the problem of dividing apparatus is settled the operation resolves itself into elementary principles and carefulness.

However, for the unlucky ones, here is a solution which, if not 100 per cent perfect, can be accurate enough for average needs. This alternative, like most things, is a variation on an ancient theme.

The diameter of the dial as shown is 3 in., but this dimension is by no means important, and, with requisite modification to the index finger, could be smaller in diameter without disadvantage. With 125 divisions on a 3 in. drum the spaces between work out at about 0.075 in.—not so *very* much larger than 0.0625 in., i.e. $\frac{1}{16}$ in.

Now starting from base with the latter dimension, 125 divisions at $\frac{1}{16}$ in. each gives a total of 7.82 in., and the diameter of a circle of this circumference is approximately 2.485 in. Find an old watch spring—or, if you prefer it, a strip of thin brass, ¼ in. wide by about 12 in. long—and a strip of flat wood of the same length with a planed edge. Lay the spring alongside a 12 in. straightedge on the wood, clamping all firmly together by means of toolmaker's clamps. Next with a square and a sharp scriber make a mark across the spring at every $\frac{1}{16}$ in. division; if you are handy with a graving tool a deeper and more permanent mark can be made.

Do this until you have 126 marks, i.e. the last to register with the first on assembly. At every fifth interval scribe the mark halfway across the spring, and at every tenth the whole way across. At the first and last mark drill a 5/64 in. hole in the centre line of the strip.

Now the wheel: reduce the index drum to 2½ in. dia., and then drill and tap a No 7 BA hole halfway across the index band; make a temporary plain peg slotted on the end for a screwdriver. Reference to Fig. 7 will make all this clear.

With careful cuts reduce the diameter of the drum; test by screwing in the peg and then entering it in the zero hole in the spring; by wrapping the latter round the drum, pulling it tight by a hand vice gripping the free end, you should be able finally to thread the pin into the hole on the 125 mark.

Scarf the ends of the spring as shown and substitute a cup or cheesehead screw for the peg; drill and insert a similar screw diametrically opposite to the first. You should now have a serviceable and fairly accurate lead-screw index. The locking arrangement which secures the wheel is slightly unorthodox—but it works !

● *To be concluded next week*

BTC ORDER LIGHT-WEIGHT RAIL BUSES

The British Transport Commission have placed contracts with five firms—four British and one German—for 22 lightweight diesel rail buses for use on rural services which must be operated with the greatest economy if railway traffic is to continue.

No rigid design specification has been issued so as to enable the firms to make an individual approach within the limits of maximum dimensions, performance required, and brief details of seating and fittings.

Each rail bus will be powered by a single under-floor engine of between 112 and 150 h.p., providing a maximum speed of about 55 m.p.h., and has seating capacity for 46 to 54 passengers according to type. The vehicles will have air-operated brakes and some will be fitted with couplers for use with trailer coaches if required.

It is expected that the lightweight diesel rail buses will be introduced early next year in the Eastern, London Midland, Scottish and Western Regions of British Railways.

LOCOMOTIVES I HAVE KNOWN

by

THESE engines, of which there were no fewer than two hundred and sixty, must be included among the classics. Not that there was anything exciting or remarkably outstanding in their design; but their subsequent history and, particularly, their war record render them deserving of a niche to themselves in the annals of locomotive history.

It is, indeed, good to know that the British Transport Commission has acquired No 2516 for permanent preservation; in addition to being a memento of a class that had a wonderful history, she is an example of the typical, plain, simple and straightforward 0-6-0 goods engine that has served the railways of Britain so well for more than 120 years.

To me, the GWR 2301-class 0-6-0s—or Dean Goods, as they have become universally known—were always extremely attractive, chiefly because of their extraordinary versatility; for I have seen them on literally every class of locomotive work from express passenger trains to shunting in locomotive running-shed yards; and that is no exaggeration.

In two great wars, a large number of these engines were sent to work behind various battle fronts, where they performed yeoman service. Because of their simplicity, power and lightness, they could be sent out on the flimsiest of track and handled successfully by the least experienced of enginemen for hauling heavy trains of military supplies to the most unlikely places. On this work they won for themselves opinions that they were " anybody's engine " and the " backbone of the Railway Operating Division."

The wars over, and just after the nationalisation of British railways had been accomplished, came the crowning glory of the Dean Goods. Their numbers had been woefully diminished by war casualties, and the few which were still in service were obviously nearing the end of their usefulness. But the problem arose as to what should replace them.

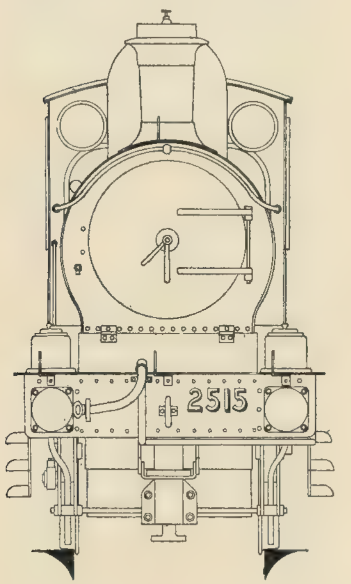
Eventually, a then new LMR Class 2 MT 2-6-0 engine, No 46419, was sent to the Western Region for trial on Dean Goods' duties. For some time this engine ran in direct competition with a Dean Goods on certain routes. At first, the drivers reported that the 2-6-0 was no better than a Dean; then they went so far as to complain that the 2-6-0 could not time the trains. Swindon sent out some inspectors and the dynamometer car to make a strict investigation into the matter, and they confirmed the drivers' reports.

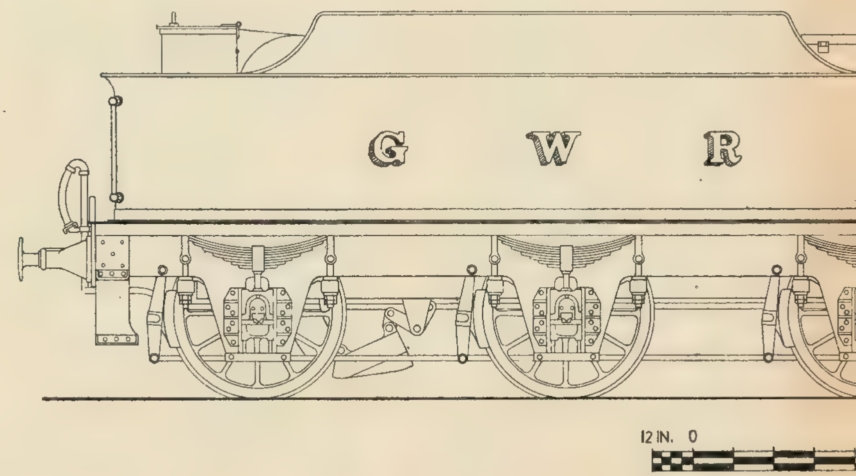
The next step was to take that 2-6-0 into the works at Swindon and put her on the testing plant, where she was given a thorough test.

There happened to be in the erecting shop a Dean Goods, No 2579, which had just been given a complete overhaul and refit; before she was returned to her home station, she, too, was given the same test. The whole of the information obtained from these tests has been published in the *Journal of the Institution of Locomotive Engineers* for September-October 1950 and it shows that the Dean engine was *the better of the two* !

This result surprised the Swindon technical staff and dumbfounded the Railway Executive's mechanical engineers, while the fact that an 1899 0-6-0 had proved to be superior to

THE GWR DEAN GOODS





No 39

y J. N. Maskelyne

a 1948 2-6-0 caused some merriment in the locomotive profession generally.

There can be little doubt that as a result of analysing the information obtained during these tests, the Swindon people made an important discovery; but what it was has not yet been clearly stated. Unquestionably, however, it has been the basis of the improved draughting arrangements that have since been successfully applied to different types of locomotives in the Eastern, London Midland and Western Regions.

The original design for the Dean Goods, or "Standard Goods" as they were semi-officially described, dated from 1883, when the first examples were built. Engines 2301 to 2320 originally had domeless boilers, with flush smoke boxes and fire-boxes. All the later engines, numbered 2321 to 2360 and 2381 to 2580, had domed boilers.

My drawing shows No 2515 in the final condition, with a modern domed boiler having a Belpaire fire-box, and may be taken as representative of the majority of the survivors of this class as they were after about 1930, though this particular boiler and the cast-iron tapered chimney first appeared on these engines some ten years previously.

The following dimensions apply to the class in the form which is seen in the drawing: cylinders, dia. $17\frac{1}{2}$ in., stroke 24 in.; wheels, dia. 5 ft 2 in.; wheelbase 15 ft 6 in., divided into 7 ft 3 in. plus 8 ft 3 in.; leading overhang 4 ft 9 in.; trailing overhang 4 ft; length of engine frames 24 ft 3 in.

The boiler was 4 ft 5 in. dia. outside the larger (back) ring, and its length was 10 ft 3 in.; the pitch of the centre line was 7 ft 3 in. There were 219 tubes of $1\frac{5}{8}$ in. dia. and 2 of $5\frac{1}{8}$ in. dia., the heating surface of which was 1,012.8 sq. ft. The firebox added 102.5 sq. ft, making the total heating surface 1,115.3 sq. ft. The grate area was 15.3 sq. ft, and the working pressure was usually 160 p.s.i., though it was higher in some cases.

A well-designed Stephenson link-motion operated the slide valves; its inclination was 13 in 87, a distinctly unusual slope. Valve travel, in full gear, was $4\frac{1}{2}$ in., and in mid-gear it was $3\frac{7}{8}$ in. The valves, which were $11\frac{3}{8}$ in. long and 17 in. wide, were provided with $1\frac{1}{16}$ in. steam lap and $\frac{1}{8}$ in. exhaust lap; they worked on port faces in which the ports were 15 in. long, $1\frac{3}{4}$ in. wide for admission and 4 in. wide for exhaust. The port bars were 1 in. wide.

Although drawings of this gear, showing the valves and port faces, have been published (*Railway Engineer*, 1889), I can find no mention of the lead. I think, however, it was about $\frac{1}{8}$ in. in full gear, though it might have varied in different lots of these engines.

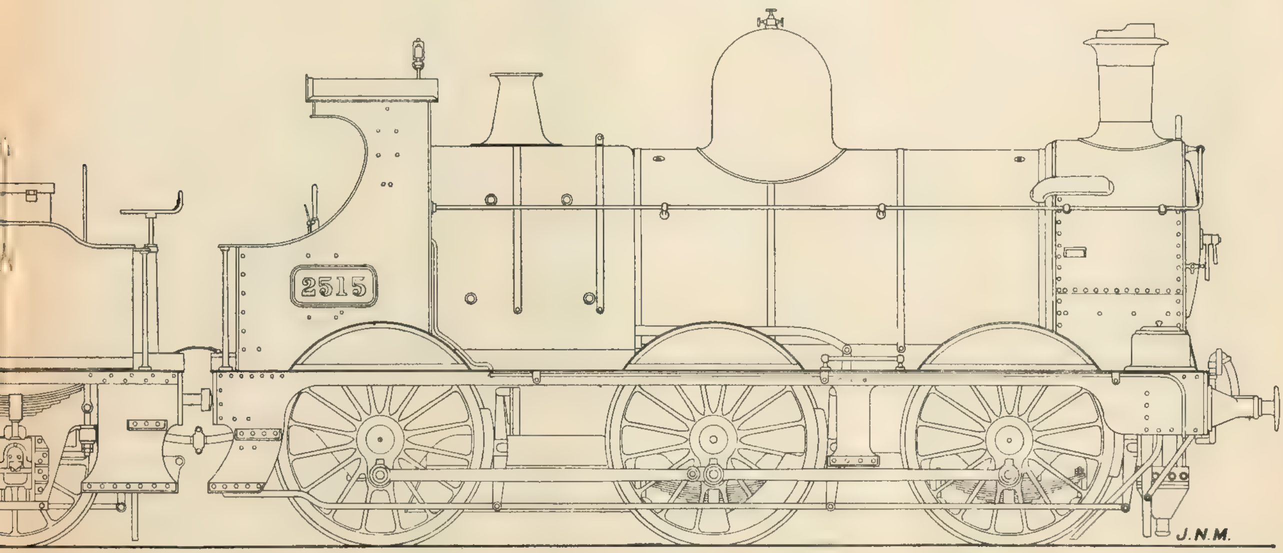
I must interpolate here that all the 260 engines of this class were built with 17 in. cylinders; in the majority, however, this was subsequently enlarged to $17\frac{1}{2}$ in., which is the figure I have quoted above.

In 1954, all except two of this class, Nos 2516 and 2538, had been broken up, after long, honourable and, in the case of those commandeered for service in two wars, unusually strenuous service.

In 1952, I was approached by Mr A. J. Maxwell, of Newton Abbot, to see if anything could be done to save one of these historic engines from destruction. I tested out this idea on fellow-enthusiasts and found it extremely popular; so, with such backing, I put it forward in the right quarter. For many months afterwards, I could get no definite information, but eventually I was told that a Dean Goods would be preserved; No 2516, withdrawn in 1954, is the one concerned.

I must add a few words about the tenders; many and various types have been attached to Dean Goods engines at different times. My drawing shows the standard Dean-cum-Churchward 3,000 gal. type as attached to some of the engines which worked a considerable amount of passenger traffic, especially in Wales; but the more usual tender was the 2,500 gal. type.

About 50 of this celebrated class survived to become the property of British Railways in 1948, and the last one, No 2538, was withdrawn last May. ■



A LOCOMOTIVE FOR BEGINNERS

By way of interlude, LBSC begins a brief description of a neat locomotive suited to enthusiasts and novices of limited means

A SHORT while ago I described how to build a simple steam locomotive especially suited to children's operation, and I offered to elaborate on it if prospective builders were sufficiently interested.

In addition to Postbag comment I have received some direct correspondence on the subject, so I carefully sorted out the various suggestions, and I have done my best to produce what might be called a de luxe version of *Pixie*. It would cost no more to build, is an ideal job for novices, and is a fairly close copy, as far as appearance goes, of a popular class of locomotive that did yeoman service on the Great Eastern Railway in days now long past.

I specified outside single-acting oscillating cylinders for *Pixie*, to reduce the job to the rock-bottom of simplicity, and strangely enough it was just this that was the controversial feature. I agree that no full-size locomotive ever had such appendages (I might add that no full-size locomotive ever had a spirit-fired water-tube boiler !) but to have put them inside would have needed a double-cranked driving axle, and a much more complicated arrangement of port blocks, pipes and reversing gear.

Objections were raised to the unsprung single driving wheels; but if these had been sprung, it would have cattled up the steam distribution. As the centre line of the axle and trunnion must pass exactly between the ports, it naturally follows that any up-and-down movement of the axle neutralises the setting, and any variation in the level of the track would cause the engine to run in jerks—if it didn't stop her altogether. Coupled wheels could not be used with cranks set exactly opposite, as the coupling-rods would tend to cross on the dead centres, and lock the wheels.

Anyway, to cut a long story short, in the design I am now presenting I have eliminated practically every objection raised. The outside cylinders are replaced by a single inside slide-valve cylinder with loose-eccentric reversing. This is quite easy to make and erect, and only needs a single-cranked axle.

Fully-sprung coupled wheels can be used, with the crankpins at the usual right angles; and with the smaller wheels and the extra adhesion the locomotive would be much more powerful than *Pixie*. The same type of boiler can be used, the only difference being that it is a little longer, but it can be worked at a higher pressure.

Older readers may recollect the LMS 4F class 0-6-0 that I built for the six-year-old son of the chicken farmer whom we stayed with for a few weeks during the flying-bomb raids of 1944. This engine had a similar arrangement of single inside cylinder and spirit-fired boiler, and she had no great difficulty in pulling my weight on a flat car. It would not entail much more work to finish the job, in a manner of speaking, and provide *Rose* with a coal-fired boiler; if anyone wishes to do so, I will provide the gen with pleasure.

As machining, fitting, and erecting jobs are similar to those described for many other locomotives appearing in these notes, I need not go into full detail with a lot of wearying repetition. The following "condensed" instructions plus the dimensioned drawings should enable anybody with the usual amount of perspicacity and patience to turn out a good job.

FRAME ASSEMBLY

The arrangement of frames is the same as on the full-size GER mixed-traffic locomotives, except that the leading wheels have the outside bearings only. Both inside and outside frames are cut from 16-gauge sheet steel, the soft blue kind being most suitable. Mark out one of each kind, temporarily rivet each to a piece of similar overall dimensions, and saw and file to outline.

Points to note when marking out are correct location of cylinder and motion bracket. The centre line of motion is obtained by drawing a diagonal line from a point exactly in the middle of the driving axle-box opening to the centre of the front end of the frame where the buffer beam will be attached. Set out the locations from this line, drilling the screwholes as shown.

The hornblocks are cut from the same kind of metal as the frames, and no castings are required. The leading horns are straight-sided and flat, and attached to the inner sides of the outside frames by $\frac{1}{16}$ in iron rivets. The driving and trailing horns are bent at right angles at the bottom (see side view) to form lugs to which the hornstays are attached.

As the jaws of the hornblocks are the same width and height as the openings in the frame, they can be lined up correctly by putting a piece of bar, $\frac{5}{8}$ in. wide, in the opening, setting the hornblocks over it, and holding each in place with a toolmaker's cramp while riveting up.

As the leading axle has no bearing in the inside frame, all that is required is a plain slot to clear it.

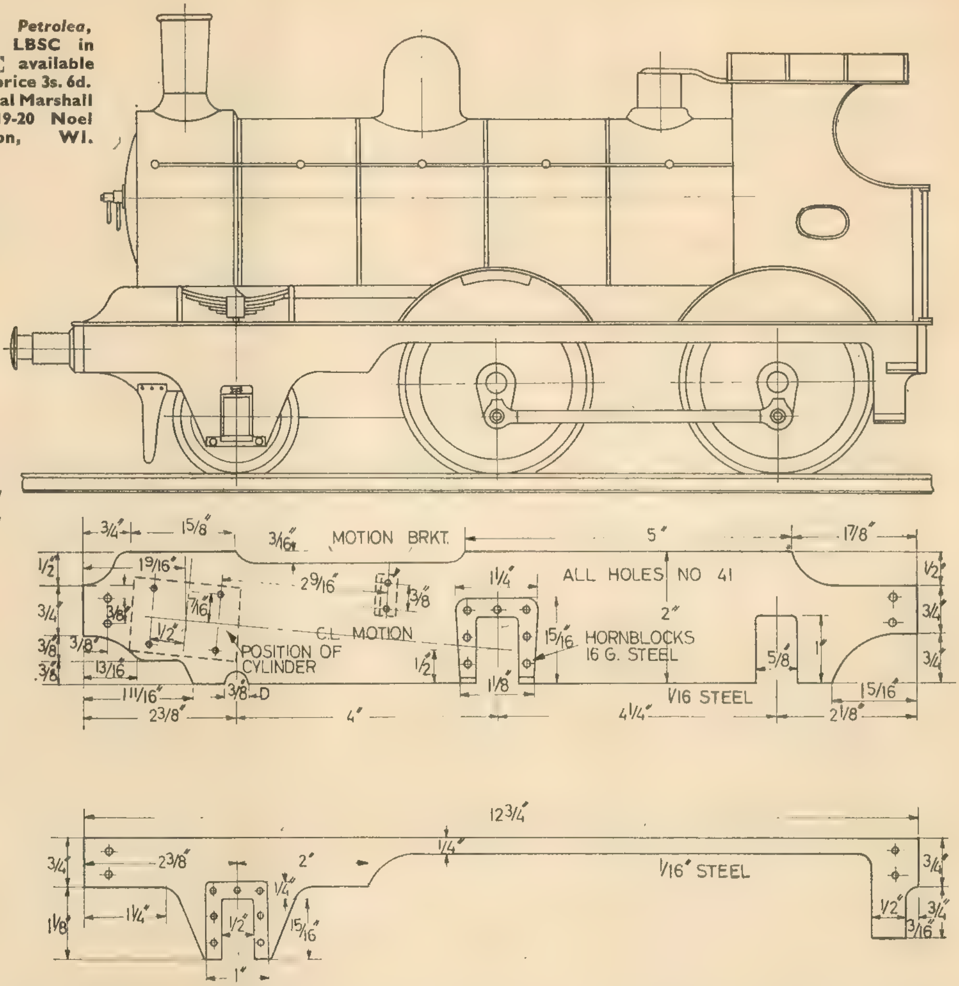
The buffer and drag beams are $4\frac{1}{2}$ in. lengths of $\frac{3}{4}$ in. $\times$ $\frac{1}{8}$ in. steel or brass angle. Pieces of $\frac{5}{8}$ in. $\times$ $\frac{1}{8}$ in. brass angle are riveted to the inner edges of the frame slots, and also flush with the cut-away ends, as shown in plan. The inner frames are driven into the slots and secured by screws as shown, then the outer frames are screwed to the end angles. They take the place of the running-board valances on a single-framed locomotive. No separate staying is needed between the inside and outside frames, as they are attached to the running boards which keep them in alignment.

When erecting, level up the inner frames and beams on the lathe bed, or something equally flat and true, before drilling and tapping the screwholes in the angles. If you get that part of the business right, as fully described in previous notes, the outside frames will fit in correctly without any special lining-up.

AXLE BOXES

The leading axle boxes can be made from $\frac{5}{8}$ in. square rod, bronze or gunmetal for preference. Clamp a length sufficient for two boxes under the slide-rest toolholder, and mill the rebate with an end-mill or slot-drill in the three-jaw. The rebated part should fit easily between the horn-

Blueprints of *Petrolea*, referred to by LBSC in this article, are available in seven sheets, price 3s. 6d. each, from Percival Marshall Plans Service, 19-20 Noel Street, London, W1.



General arrangement with details of the inside and the outside frames

block jaws in the outside frame, but should not be slack. Saw the piece in half and true up the sawn faces in the four-jaw. The hole for the axle journal must be dead square with the back; if using a drilling machine, set the axle box, back upwards, in a machine vice so that the back is level with the tops of the jaws, and be careful to avoid drilling clean through the face. The front edges are bevelled off with a file for appearance' sake. Don't forget to drill the oil hole.

Springing is simple. A piece of 3/32 in. silver steel $\frac{1}{2}$ in. long is screwed into the top of each box. A bracket bent up from $\frac{5}{16}$ in. × $\frac{1}{16}$ in. strip steel is riveted to the inside of the frame directly above the hornblock, and the pin passes through a hole drilled in it. The spring is wound up from 20-gauge tinned steel wire. The hornstay which prevents the box falling out when the engine is lifted is a strip of $\frac{1}{8}$ in. × $\frac{1}{16}$ in. steel with the centre part reduced to $\frac{1}{16}$ in., as shown, and it is attached to the outside of the frame by a $\frac{1}{16}$ in. or 10 BA screw at each end.

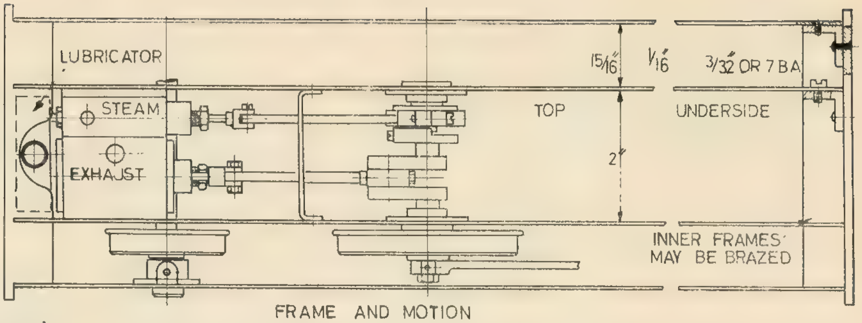
The driving and trailing axle boxes are made from $\frac{5}{16}$ in. × $\frac{3}{8}$ in. bronze or gunmetal rod, a piece approximately $3\frac{1}{2}$ in. long being required. The rebates on each side are milled as previously described, to fit nicely in the horns, and the four boxes can then be parted off in the four-jaw chuck, or sawn off to full length and the ends truly faced off in the chuck to correct length.

Fit each box to one of the openings in the frame, and mark the right-hand 1 and 2, and the left-hand 3 and 4. Make a centre pop exactly in the middle of 1 and 2, drill it No 30 either in the drilling-machine or lathe, as the hole must be dead square through the box, and use the drilled boxes as jigs to drill the boxes on the opposite side, taking great care to clamp the boxes together exactly in line when drilling the second one.

Put the boxes temporarily in the frame, and test each pair with a piece of $\frac{1}{8}$ in. silver steel put through the holes. If this lies squarely across the frame, open out the holes with 23/64 in. drill. Next fit the hornstays to the lugs at the bottom of the hornblocks; these are merely $1\frac{1}{8}$ in. lengths of $\frac{5}{16}$ in. × $\frac{1}{16}$ in. steel drilled as shown and attached by 3/32 in. or 7 BA screws.

Put each box in its opening, flange outside, jam it tightly against the hornstay, put a No 41 drill through the hole in the stay and make a countersink on the bottom of the axle box. Drill this No 48 and tap 3/32 in. of 7 BA. Screw in a spring-pin made from 1 in. of 3/32 in. silver steel screwed at both ends as shown,

A LOCO FOR BEGINNERS



FRAME AND MOTION

fit a 20-gauge tinned steel wire spring on it and secure it with a commercial nut and washer.

These springs cannot be properly adjusted until the engine is completely finished and in working order; the nuts are then adjusted so that the axle boxes are midway between the top of the opening and the hornstay. The engine should then stand level, with the beams the same height at each end from the rail heads. Meantime, to keep the boxes in running position when erecting cylinder and motion, put a little piece of ⅛ in. square rod between axle box and hornstay, and tighten the nut sufficiently to keep it there. Finally put a ⅜ in. parallel reamer through each pair of boxes while they are in place in the frames; this ensures correct alignment.

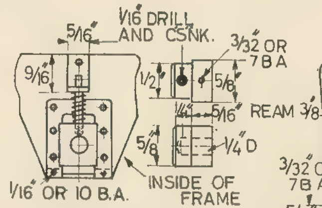
WHEELS AND AXLES

The leading wheels are 1¾ in. dia. on tread, with 3/32 in. depth of flange, and are turned as described recently for *Zoe*. The axle is made from a piece of 5/16 in. round mild-steel rod 3⅞ in. long. Chuck in the three-jaw, face the end, and turn a full ¾ in. to ¼ in. dia., which should be a press fit in the reamed hole in the wheel boss. Reverse in chuck and repeat the operation, leaving 2 9/32 in. between shoulders. Both wheels can then be pressed on to the axle, but need not be erected in frames until after the cylinder and motion have been made and installed in place.

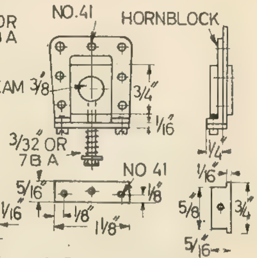
The coupled wheels are 2¾ in. dia. on treads, with same depth of flange, and are also machined like those for *Zoe*, but to the dimensions shown in the drawing. Drill the crankpin holes by aid of the simple jig previously described, using a No 24 drill, and ream them 5/32 in. The crank pins can then be turned and fitted right away.

Chuck a piece of 3/16 in. silver steel and turn 5/16 in. length to a press fit in the reamed hole. Part off at a full 5/16 in. from the shoulder, reverse in the chuck, turn ⅛ in. of the end to ⅛ in. dia. and screw ⅛ in. or 5 BA. Put a brass nut on the thread to protect it from damage when pressing the pin into the wheel boss by aid of the bench vice.

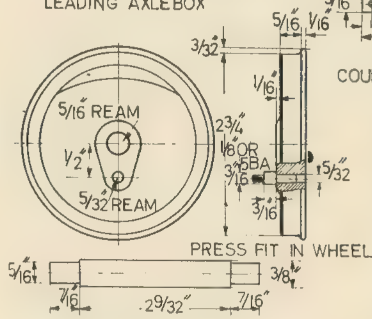
Warning—pins press-fitted into cast-iron wheel bosses must not be *too* tight, or the bosses will split. The pins should just be tight enough to prevent their coming out or turning.



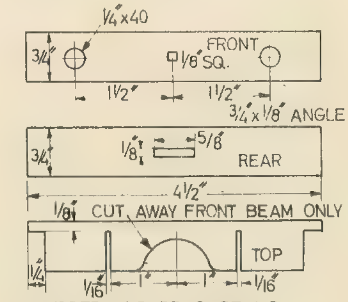
LEADING AXLEBOX



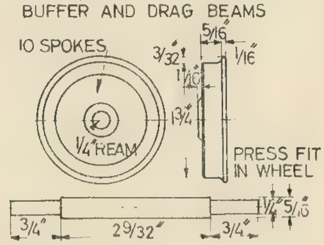
COUPLED AXLEBOX



COUPLED WHEELS AND TRAILING AXLE



BUFFER AND DRAG BEAMS



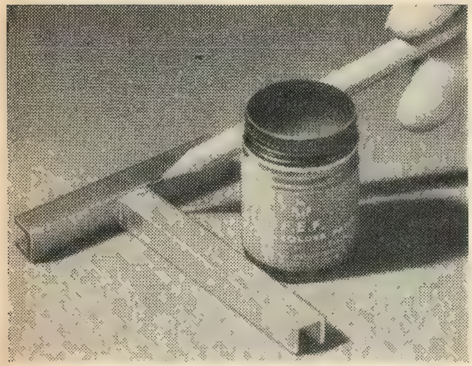
LEADING WHEELS AND AXLE

The trailing axle is straight, and is turned from a piece of ⅜ in. round mild steel 3¼ in. long. If the three-jaw chuck is true within the usual limit, simply chuck the rod, face the end and turn 7/16 in. length to a press fit in the wheel boss. Reverse in chuck and repeat operation, leaving 2 9/32 in. between shoulders. If the chuck is out of truth, the axle must be turned between centres, using a little larger steel.

The wheel seats must be true with the axle or the wheels will run like eccentrics. Press one wheel on the axle, put it through the trailing axle boxes, and then put the other wheel on, setting the crank pins at right angles as described for *Zoe*. All being well I will describe how to make the crank axle and fit the eccentric and wheels in the next instalment.

Meanwhile, if any reader has a yen to build this engine in 3½ in. gauge, he can do so by increasing all the dimensions in the proportion of 5 to 7. It would be a great help if he obtained the blueprints of *Petrolea* from the Plans Service as this engine is of similar type to *Rose*, excepting that she has larger wheels. In the 3½ in. gauge size a better turning movement would be obtained by using two cylinders of medium size, and the simple loose-eccentric valve gear could still be retained; anyway I will be glad to go into this later if there is any call for the information.

●*To be continued*



An example of a joint made with Fryolux silver solder paint

AROUND THE TRADE

A regular feature discussing tools and accessories of use in the home workshop

Conducted by EDGAR T. WESTBURY

Fryolux solder paints

THE wide range of solders and fluxes manufactured by Fry's Metal Foundries Ltd, Tandem Work, Merton Abbey, London, SW19, embraces special preparations for electrical work, lead pipes, hot dipping, machine soldering and application by solder bit.

Of particular interest to model engineers, and others dealing with operations on small components, is the range of solder paints, which consists of a combination of powdered solder and a specially prepared flux. This can be applied in the form of a thin coating to articles before fitting together, and when heated to the melting point of the solder, will produce a perfect joint without the waste and mess generally associated with ordinary methods of soldering.

We have tested samples of these preparations and find that they simplify nearly all the soldering problems which arise in the small workshop, and enable the most suitable solder to be used for specific metals or purposes. The standard grade solder paint, which has a melting point of 453 deg. F., is equivalent to the best quality "tinman's" solder and will suit most normal work.

For purposes where a lower soldering temperature is desirable or essential, such as for parts liable to distort under heat, or for attachment to other parts already having soldered joints, Grade K solder paint, having a melting-point of 374 deg. F, is recommended.

Pure tin paint is available for purposes where the presence of lead is undesirable, such as for the soldering of food containers. The latest addition to the range of solder paints is a combination of FEF silver solder and No 3 brazing flux, having a melting-point of 620-640 deg. C. suitable for joints in work subjected to high temperature, or where special strength is called for, such as in small boilers. This is applied in the same way as for low-temperature solders, but more liberally, and the joint then heated to dull red heat.

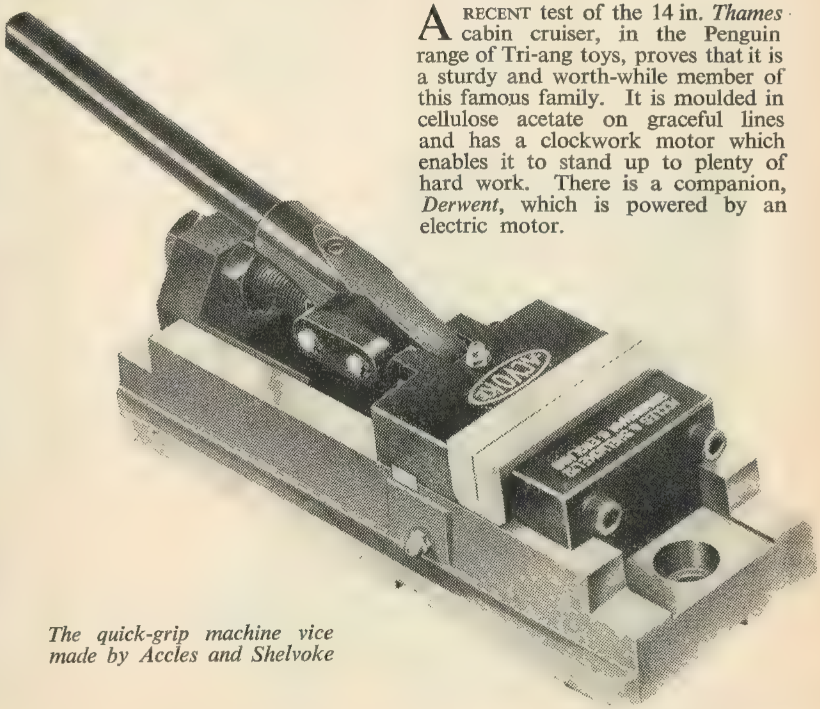
Many other solders, fluxes and tinning compounds are described in the reference data leaflet issued by Fry's Metal Foundries, to whom inquiries respecting these products should be addressed.

Quick-grip machine vice

MANY ingenious appliances have been produced for speeding up the clamping or securing of components for milling, drilling and other machining operaions. One of the handiest of thesets that produced by Accles and Shelvoke Ltd, Talford Street Works, Birmingham, 6. The special features of ihis are the toggle lever, which can be arranged to work either in a vertical or horizontal arc to suit convenience and the long. close-fitted slide carrying the moving jaw, which ensures precision of movement and prevents any possibility of the work being forced out of truth when clamped.

Unlike most machine vices, this type has the moving jaw on the remote side from the actuating lever, the slide thus being extended under the fixed jaw, which is keyed in position and further secured by setscrews from the underside of the base. Pre-adjustment for size of work is effected by means of a screw, with lock-nuts, at the remote end of the jaw slide.

It should be observed that this vice is particularly intended for use in quantity production on components of uniform size; its special quick-action properties do not apply when it needs to be readjusted for work of varying shape or size. The usual hardened and ground steel jaws are fitted, and the appliance as a whole is very well made and finished.



The quick-grip machine vice made by Accles and Shelvoke

Sturdy toy boat

A RECENT test of the 14 in. *Thames* cabin cruiser, in the Penguin range of Tri-ang toys, proves that it is a sturdy and worth-while member of this famous family. It is moulded in cellulose acetate on graceful lines and has a clockwork motor which enables it to stand up to plenty of hard work. There is a companion, *Derwent*, which is powered by an electric motor.

The *Thames* costs 25s, and the *Derwent* 39s. 6d. The manufacturers are International Model Aircraft Ltd, of Merton, London, SW9.

Model boat propellers

NEW range of propellers for power-driven boats has been introduced by Bond's o' Euston Road Ltd, 357 Euston Road, NW1. They are fabricated in hard brass, by silver-soldering blades into slotted hubs, and are thus stronger and more resilient than cast propellers; if accidentally bent, the blades can be straightened without risk of fracture.

A special feature of the method of production is the use of accurately formed dies for setting the pitch after fixing the blades; correct pitch and also uniformity for all three blades can thus be positively guaranteed in all cases.

The propellers are supplied either right-handed or left-handed, in the following sizes: $1\frac{1}{4}$ in. dia. × 1.8 in. pitch, boss tapped 7 BA; $1\frac{1}{2}$ in. dia. × 3 in. pitch, tapped 5 BA; 2 in. dia. × 3 in. pitch, tapped 5 BA; $2\frac{1}{2}$ in. dia. × 4 in. pitch, tapped 5/32 in. Whit.; and 3 in. dia. × 4 in. pitch, tapped $\frac{3}{16}$ in. Whit.

Samples of these propellers have been submitted to us for inspection, and we find them highly satisfactory in respect of accuracy and finish.

The new range of power boat propellers marketed by Bonds o' Euston Rd

Pressurised oil dispensers

PENETRATING oil is of inestimable value but often its efficacy is impaired because of the difficulty in reaching the affected parts by means of the conventional oilcan.

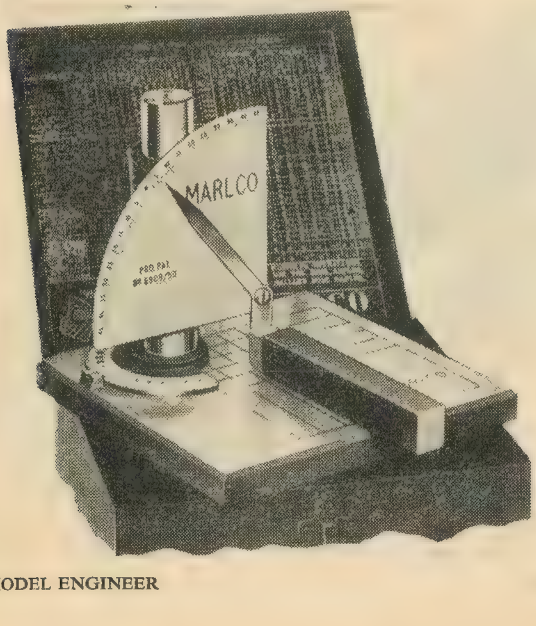
Amber Oils, of Albermarle Street, London, W1, has gone a great way towards solving this problem with the introduction of pressurised dispensers.

Aerozene, which is a combined penetrating oil and spring lubricant, is now available in one of these new dispensers. Slight pressure on the small plastic valve at the top of the container releases a high-pressure spray of oil, which can reach a distance of 6 ft.

Rusolvent, an easing fluid, can be obtained in the same type of dispenser, and obviously has some very useful workshop and domestic applications.

The makers claim that using oil from pressurised dispensers is much more economical and effective than ordinary methods.

Both Rusolvent and Aerozene cost 7s. 6d. in 12 oz. pressurised tins. The gas used is non-inflammable, inert and non-toxic.



The new Marlco tool protractor

Twist drill handbook

READERS everywhere will welcome a revised edition of the valuable Dormer Information Handbook. This issue has an increased number of pages (80) and has several new sections, including: drills designed for special types of work; modifications to standard drills for special applications; recommendations for drilling titanium and thermoplastics; nomenclature of centre drills.

The basic matter of decimal equivalents, speeds and feeds, tapping drill sizes, hints on drilling, point sharpening, etc., is included and, in some instances, enlarged upon.

The Sheffield Twist Drill and Steel Co., Summerfield Street, Sheffield, 11, will supply a free copy to ME readers who request it.

Tool protractor

THIS instrument, the Marlco, withdrawn some four years ago, has just been reintroduced by W. H. Marley, New Southgate Works, 105 High Road, London, N11. It is intended for measuring turning tool angles and costs £9 16s.

With this device, angles relative to the cutting edge of turning bits can be directly measured and it is also very useful for determining the components of any compound angle. This simply operated instrument should be an aid to maximum production in the tool room of any engineering concern.

Do not forget the query coupon on the last page of this issue

READERS' QUERIES

This free advice service is open to all readers. Queries must be on subjects within the scope of this journal. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling, cannot be given: stamped addressed envelope and query coupon with each query. Mark envelope "Query," Model Engineer, 19-20 Noel Street, London, W1.

Forming domes

I should be grateful if you could advise me on a satisfactory method for making domes from sheet copper and plates. They vary in thickness from 16 s.w.g. to ¼ in. and are up to 15 in. dia. × 3 in. deep.

I also have some 3 in. o.d. × 2½ in. and 2¼ in. bore red brass tubing to bend into complete loops which have three radii. The loops start off with an 8 in. inside radius, then change to a 6 in. radius—and the last bend before the leg has a 4½ in. radius. If this tubing were in copper or steel, I would be quite happy, but I am afraid of the brass cracking with heat.—ER, Wrexham.

▲ *The most satisfactory method of forming domes would be by spinning, and this can be done on any lathe provided that it has a fairly rigid headstock and is fitted with a simple form of spinning rest to take the thrust of the tool.*

The answer to your tube bending problem is to use a suitable grade of brass. The type known as Cartridge brass would be very suitable and if you put this problem up to the Muntz Metal Co., West Bromwich, South Staffs., or to the Delta Metal Co., E Greenwich, London SE10, they will be able to supply you with a suitable grade of material.

Mandrel trouble

Soon after acquiring a second-hand Myford ML2 I discovered that the bearings were worn, causing a wobble of about five thou at the nose end. Can you suggest a simple remedy ?

I have been all over the bearing surface of the mandrel, and it "mikes" a dead inch all round. The movement is not up and down but more towards the pull of the belt; I suppose many years of work has caused this.—DRT, New Cross, London.

▲ *It is assumed that you are sure that this trouble is due to wear in the bearings and not to bending or deterioration of the mandrel nose. The latter would be extremely difficult to correct, but if the bearings are worn correction may be done comparatively simply.*

This particular type of lathe, it is believed, had a mandrel running directly in the cast-iron headstock, no bushes being fitted. Therefore, it would be desirable to true the surfaces of the bearing bores by hand scraping or lapping (the latter would probably be the easier in your case) and, as the mandrel would then be slack, it could be built up to the required size by electro-deposition.

For the lapping processes, an aluminium or copper surfaced lap could be used, long enough to pass through the two bearings and capable of sliding endwise while being rotated. It is important that the sliding movement should be kept up continuously and an abrasive, such as fine carborundum paste, could be used for lapping. After the bores have been thoroughly trued up—which can be detected by the production of a uniform matt surface all over—all traces of abrasive must be removed by washing out with petrol or paraffin.

The exact size of the bearing should then be gauged or a plug gauge turned to an exact fit. This will give a guide to the amount the mandrel surface must be built up.

Electro-deposition is carried out by the following firms:

Fescol Ltd, 41 *North Road, London N*9; *Durion Ltd,* 11 *Brunel Road, London W*3; *Monochrome Ltd, Studley Road, Redditch, Worcestershire.*

Steel strip for leaf springs

Can you please recommend a source of supply for steel strip suitable for *Virginia* leaf springs?—BW, Leamington Spa.

▲ *Suitable steel strip for making leaf springs is obtainable at any metal warehouse. It is known as gauge steel since it is used chiefly for the making of feeler gauges.*

Ignition for Cadet

I have recently made at school the *Cadet* 5 c.c. 2-stroke petrol engine designed by Edgar T. Westbury, but am at a loss for the accessories necessary to make the engine *work*. Can you help me, please ?—ISH, Birmingham.

▲ *First of all it is necessary to use a battery and coil for ignition. This should be obtainable from local model accessory dealers, but if any difficulty in getting it is experienced write to Ripmax Ltd,* 39 *Parkway, London NW*1, *or Z. N. Motors Ltd,* 904 *Harrow Road, Willesden, London NW*10.

The use of accumulators for ignition of small engines is strongly recommended—though it is possible to operate the ignition coil on dry batteries provided that they are of ample capacity. It is also possible to run these small engines without the use of an ignition coil by using a glow plug which is energised directly from a low tension battery. But in this case it is necessary to use specially compounded fuels which are much more expensive than the normal type of petrol/oil mixture as used with spark ignition engines.

If you are in doubt as to the method of fitting up and adjusting ignition gear on a small engine, the Percival Marshall handbook Model Petrol Engines (price 8s. 6d.) would, it is suggested, be very helpful to you.

A milling machine

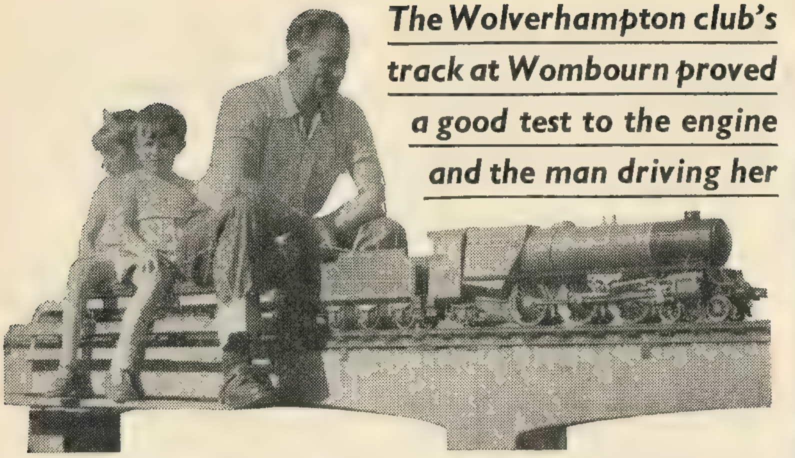
I would appreciate your opinion as to which would be the more useful in the construction of the larger sizes of live steam locomotives: a shaper or a milling machine. I realise that a shaper is mostly for working up flat surfaces and a milling machine, as the name implies, for milling grooves, keyways, gears, etc.—WFW, Miami Beach, Florida.

▲ *You would be well advised to obtain a really good milling machine in preference to a shaper if it is a case of choosing between one or the other. The milling machine is much the more useful of the two in the construction of the larger sizes of live steam locomotives.*

Thread chasers

Can you tell me where I can obtain thread chasers ? I have a number of outside chasers and wish to get an equivalent number of inside ones to make up into sets.—WCP, Farnham, Surrey.

▲ *Thread chasers, for both inside and outside threads, can be obtained from Buck and Ryan Ltd,* 310-312 *Euston Road, London NW*1.



The Wolverhampton club's track at Wombourn proved a good test to the engine and the man driving her

Norman Daintree testing KING EDWARD VII *on his track at Gerrards Cross*

WEST MIDLANDS RALLY

reported by Northerner

VENUE for this year's Rally of the West Midlands Federation was the Wombourn track of the Wolverhampton club—a track I had not visited before, but which I certainly hope to see again.

It is a large oval of more than 600 ft, set on concrete arches, allowing high speeds with safety. At the same time, one of the straights is rather a stiff climb, a good test of both engine power and engine driver, since in getting away from the starting point the bank has to be tackled straight away.

One of the first fellows I ran into was an old acquaintance, E. P. Bacon, of Solihull, who had just been running his much admired *King Edward VII*, a $\frac{3}{4}$ in. scale replica of the GWR loco. He told me that the engine had actually been built by his friend Norman Daintree, of Gerrards Cross, side by side with another King-class locomotive, *George VI*, for the latter's own use.

The King was a magnificent piece of work, full of detail, and ran as well as she looked, I was assured. She is Mr Daintree's ninth engine, the others being *Petrolea*, *Jeanie Deans*, the GNR *No* 1, two *Hielan' Lassies*, (one with Baker and the other with Walschaerts gear), *Doris*, and *Duchess of Buccleuch*. Quite an impressive array!

Another beautiful example of true craftsmanship was the LMS 0-6-0 tank engine by A. T. Parrott, of Wolverhampton, who was awarded the Campbell Cup for his work. This locomotive is built to the Austen-Walton Twin Sisters design, with a few modifications. Among these was a handpump, fitted in the near-side tank; it was little needed, however, since the injector seemed to do all that was required of it.

This 5 in. gauge French Pacific owned by R. Hardwick, of Wolverhampton, is 34 years old

An unorthodox but attractive stainless steel finish was one feature of the LMS 4-6-0 *Black Watch* built to ¾ in. scale by J. P. F. (I nearly wrote "Casey"!) Jones, who was runner-up with the award of the Addenbrooke Cup. Although my personal preference is for a correct painted livery, it must be admitted that the bright finish had a certain distinction, probably because it was kept beautifully polished.

This engine was commenced to Henry Greenly's *Royal Scot* drawings, but Mr Jones again has made some modifications during the seven years' work he has put into her. Finish was excellent throughout, and the engine ran very well indeed.

Right: *F. T. Lippiatt, here seen raising steam, built this Stanier tank engine to LMS drawings*

Left: *This fine example of the Twin Sisters design won the Campbell Cup for A. T. Parrott, seen at the regulator of No* 11270

Yet another mighty hauler was the Stanier 2-6-2 tank in 5 in. gauge built by F. T. Lippiatt, of Birmingham. She had a good finish, and her performance proved the quality of the workmanship that had been put into her.

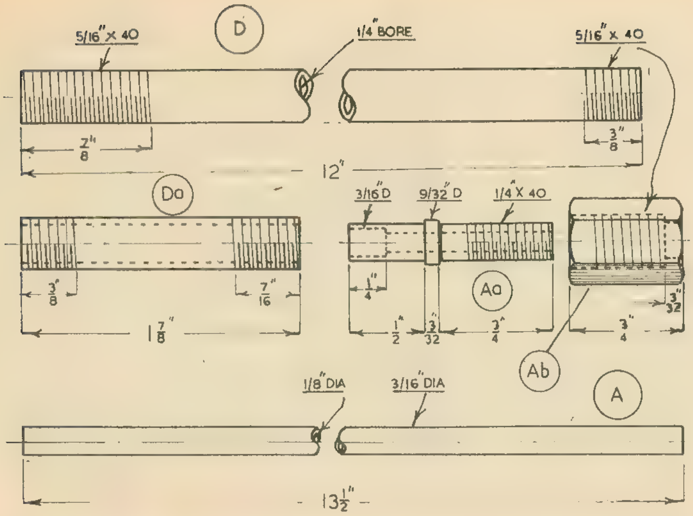
An unusual engine was the 5 in. gauge French Pacific driven by owner R. Hardwick, of the home club. She had been built as far back as 1923, and purchased later by Mr Hardwick. Another Wolverhampton member on the track was C. J. F. Cox with his *Tailwagger*, a 5 in. gauge free-lance side-tank 0-4-0. This loco was left in a bright brass finish, but was not so immaculate as Mr Jones' *Black Watch*.

Then there was K. Lapper of the home club driving Chairman B. Princep's LNER 4-6-2. Mr Princep likes to build engines, but is quite happy to see them perform in other hands. I gather that he is never short of a deputy!

These were just a few of the very many fine locomotives to be seen on the track and the steaming bays, which, by the way, are parallel lengths of track away from the main track. This means that engines have to be carried from the one to the other; not easy with a large engine, but, of course, there is always plenty of man-power available.

One thing about a club, and even more about a Federation, is that willingness to help the other chap. ■

Right : *J. P. F. Jones driving his stainless steel* BLACK WATCH, *which took seven years to build*



SPRAY-MIST LUBRICATION for the SMALL WORKSHOP

By DUPLEX

THE fluid tube *D* consists of an assembly comprising a pair of tubes, a T-piece and a union nut used to secure the air tube in place. The tubes are made, if possible, from $\frac{5}{16}$ in. dia. steel tube having a bore of $\frac{1}{4}$ in. dia.

The steel I used was war-surplus material and may not now be procurable. In this event it will be necessary to use an alternative and to modify some of the drawing dimensions to suit.

In some circumstances, also, the length of the long tube will need to be modified. I have used tubes both 12 in. and 6 in. long, depending upon the type of machine to which the equipment was to be fitted. The detail drawings, Fig. 6, give dimensions for the 12 in. pipe; if it is desired to make pipes of alternative lengths, the necessary dimensions must be calculated accordingly.

Making these pipes scarcely calls for comment, though it should be mentioned that, since the walls of the tubes are thin, some care must be taken when threading them, so it is well to do this work in the lathe using a die holder held in the tailstock.

The union nut is a straightforward piece of work and can be made from either hexagon brass or steel, or even from round material if a pair of spanner flats is subsequently formed upon the component after the general machine work has been completed.

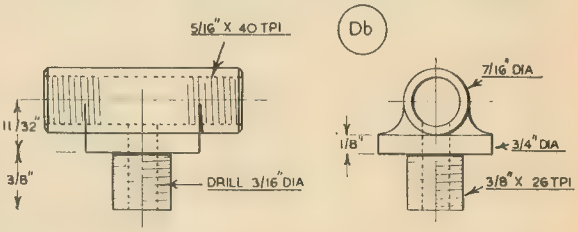
The T-piece, however, is a more complicated component. In the first place, a suitable piece of brass or light alloy must be marked out so that the work can be mounted in the four-jaw chuck for turning and boring. It is best to form first that portion of the component comprising the spigot threaded $\frac{3}{8}$ in. × 26 t.p.i., at the same time drilling the $\frac{3}{16}$ in. dia. axial hole. Do not attempt to drill too deeply or when the 9/32 in. dia. hole at right angles comes to be formed the drill is sure to wander.

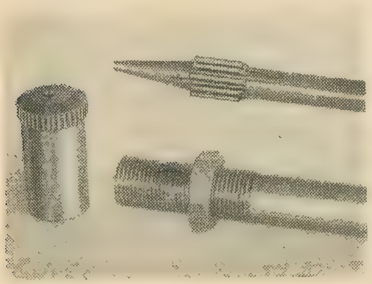
When this part is completed, the work is removed and replaced in the independent chuck so that the 9/32 in. dia. bore and the $\frac{5}{16}$ in. × 40 t.p.i. thread can be formed at one operation. The opposite end is best threaded with the work mounted on a screwed mandrel.

The air tube *A* is simply a length of brass or copper pipe having an adapter at one end and the specially contrived air jet at the other. Little need be said about either the air tube or the adapter, for which dimensions are also given in Fig. 6, but a word or two on the air jet *B* will not be out of place. The purpose of this, apart from conveying air to the spray nozzle, is to centralise the air tube.

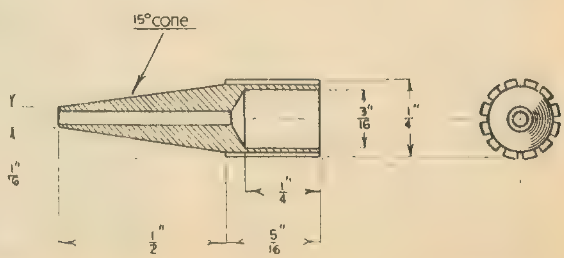
As will be seen from the detailed drawing, Fig. 7, this component is provided with serrations around its edge to allow oil to flow to the nozzle. The serrations are best formed by milling, but for those who have no

Top and right, Fig. 6: Air and paint tubes with their fittings

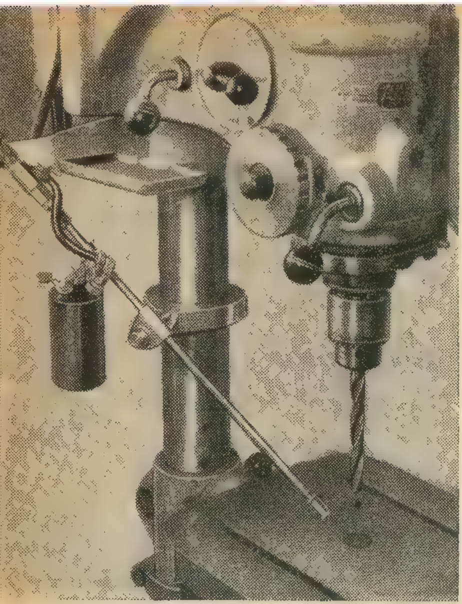




Left, Fig. 7a: Parts of the spray nozzle

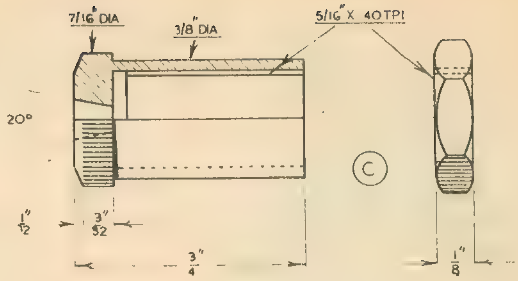


Right, Fig. 7: Details of air jet B

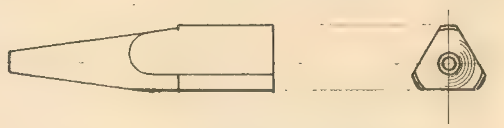


Left, Fig. 10: *The apparatus in position, ready for use*

Right, Fig. 8: *Details of spray nozzle*



Right: *Alternative type of air jet* B



facilities for machining of this nature, the purpose of the component as a whole can as well be served by filing three flats on its periphery, as illustrated in the drawing showing the modified air jet.

The air jet and the adapter are secured to the air tube by sweating.

THE SPRAY NOZZLE

The spray nozzle *C* (Fig. 8) is an important part of the equipment, and care should be taken to make it as accurately as possible. The component is preferably made from brass or light alloy, as either of these materials will allow the easy forming of the $\frac{5}{16}$ in. × 40 t.p.i. thread in the interior.

It will be seen from the detailed drawing that the outlet from the nozzle is coned some 15 deg. This coning is best carried out by means of a D-bit reamer specially made for the purpose. A reamer of this type is easily made from a short length of silver steel.

First, the material is caught in the chuck and the 15 deg. cone angle is imparted to the work by setting over the cross slide to $7\frac{1}{2}$ deg. The work is then removed from the chuck and the machining of the tool is completed by filing or milling a flat portion on the centre line, as illustrated in Fig. 9. If it is desired to make sure that the reamer does not cut too fiercely the flat should be formed some 0.005 in. above the centre line.

When this has been completed, the reamer is hardened and tempered by the methods which have been described many times in the past.

The reamer must, of course, be held in the tail-stock chuck. In this way the cone will be formed axially in the nozzle, and the spray issuing from it will emerge straight and not be deflected from the axis of the equipment.

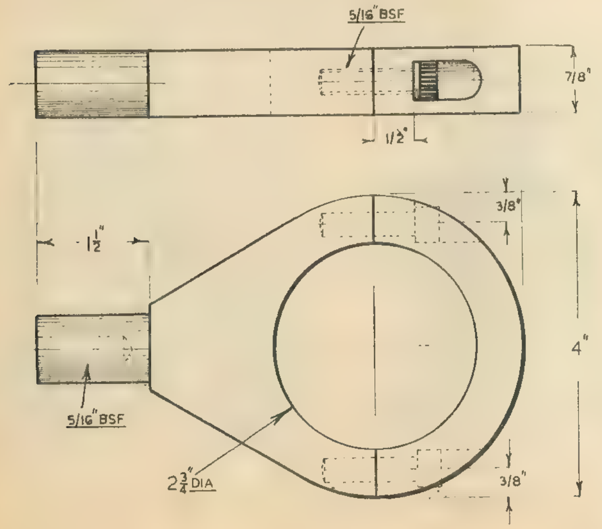
DRILLING MACHINE MOUNTING

In Fig. 10 the equipment is seen mounted on the drilling machine. As a suitable piece of material was available, the clamp for this purpose was machined from the solid. The part is held together by two Allen screws, an arrangement that allows its position to be changed at will.

It will be observed that the spray gun is held by its long tube as in the lathe mounting, the small clamp used for this purpose abutting on the cylindrical end of the main clamp, and being held in place by a single $\frac{5}{16}$ in. dia. hexagon head screw. In this way the gun can be tilted to bring its nozzle opposite to the work.

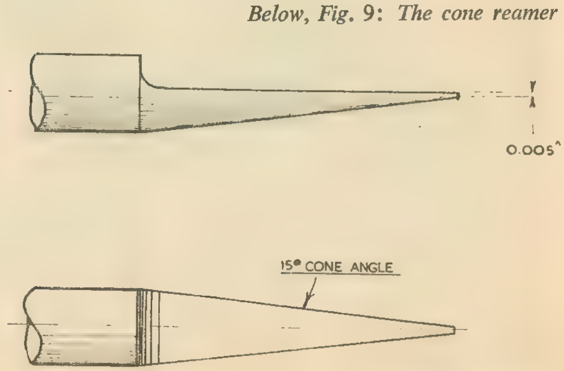
The main clamp is susceptible to variation in order to suit the particular drilling machine. It will be found, however, that for this application the basic design has much to commend it.

To be continued



Left, Fig. 11: *Drilling machine clamp*

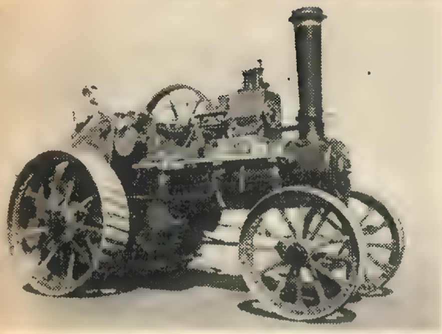
Below, Fig. 9: *The cone reamer*



TRACTION ENGINE RALLY

AT LITTLE WALDEN

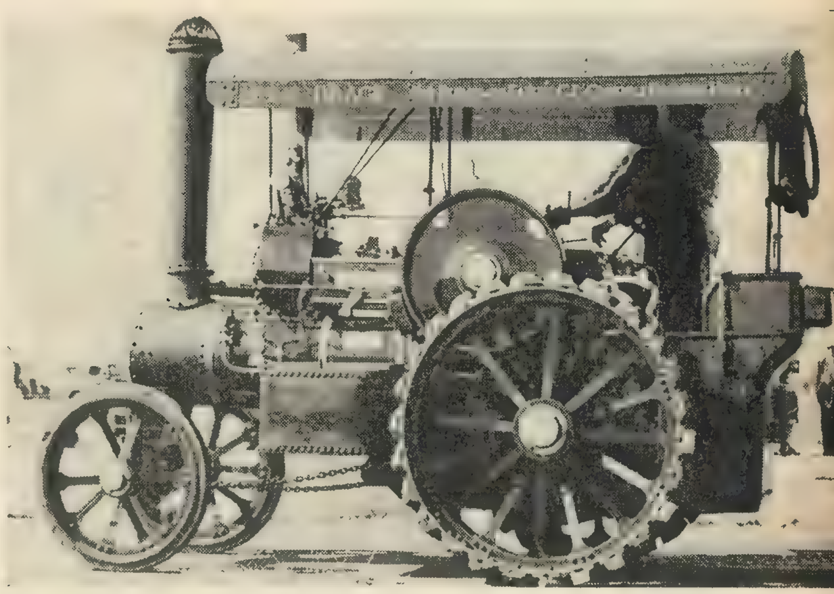
Some of the proud road locomotives of a generation or two ago demonstrate their prowess at this Essex meet

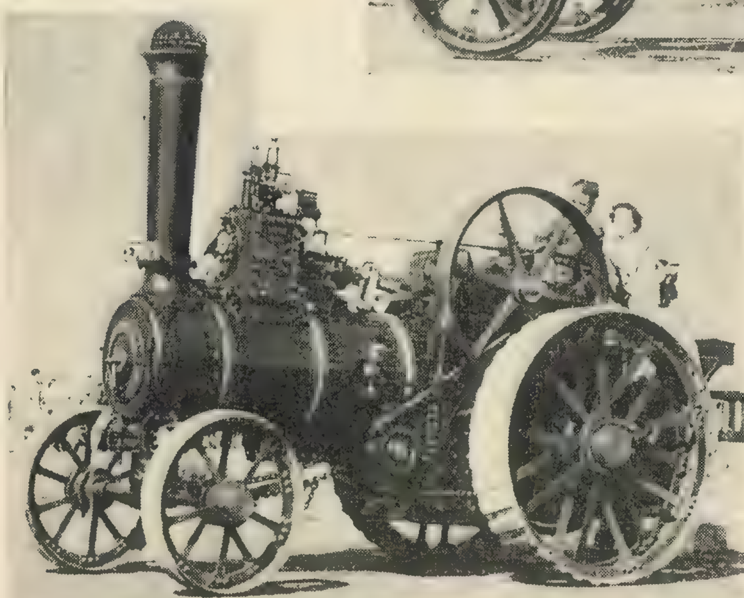


A Clayton and Shuttleworth traction engine owned by Mr A. E. Deans

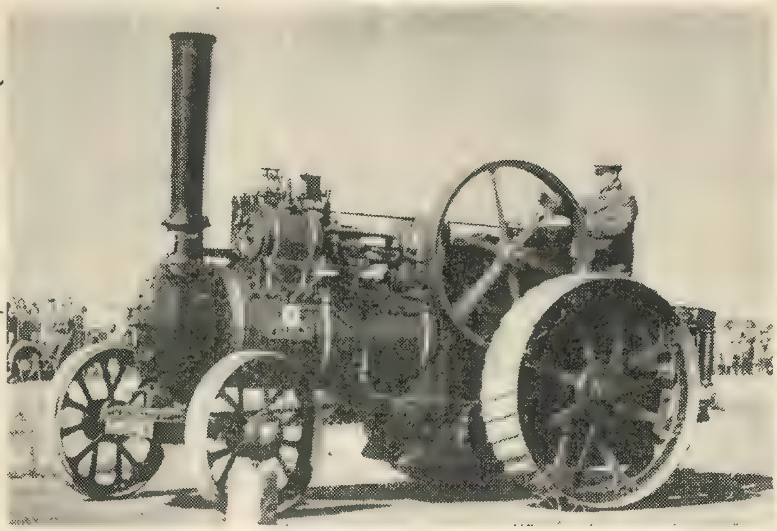
Right: A 1920 five-ton four h.p. tractor, *Tiger*. Owner is Mr A. L. Drage

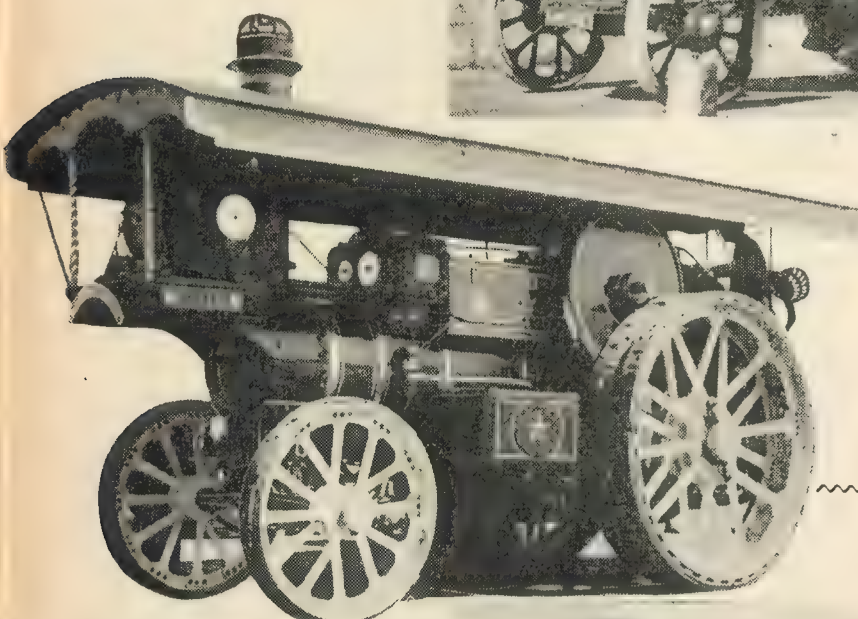
Below: Mr A. L. Frost's 1902 s.c.c. Burrell





The 6 h.p. 1903 Aveling and Porter engine belonging to Mr J. W. Clarke

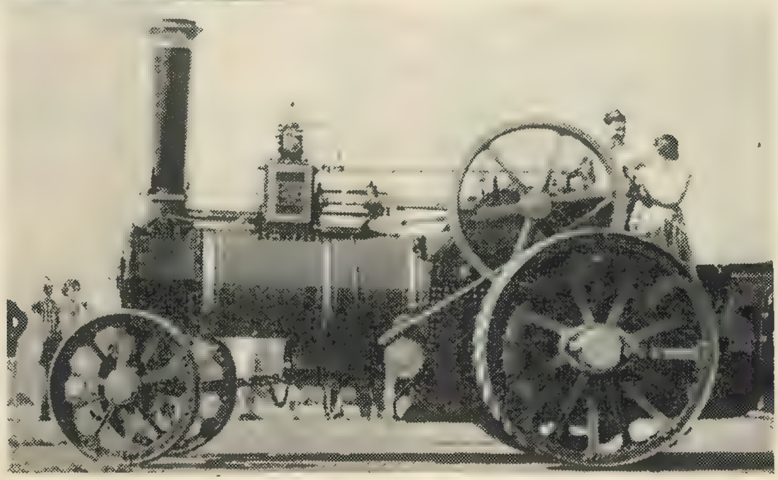




Burrell showman's *Princess Royal*, a 6 h.p. 1914 d.c.c., which is owned by Mr A. A. Archer

Left: A Burrell road locomotive, *Mary Ann*, in the obstacle event

Right: A Burrell 1932 8 h.p., *King George V*



POSTBAG

The Editor welcomes letters for these columns, but they must be brief. Photographs are invited which illustrate points of interest raised by the writer

HEAT FROM THE SUN

SIR,—Vulcan [ME, June 27] is one more reminder of the unhappy results of divorcing theory from practice. Send him on a course of elementary physics. His remarks are not those of a model (or any other sort of) engineer.

Heat from a fire will generally reach a person near it by convection and radiation. A small amount will reach him by conduction (air is a very bad thermal conductor). The radiation can be cut off by a sheet of glass.

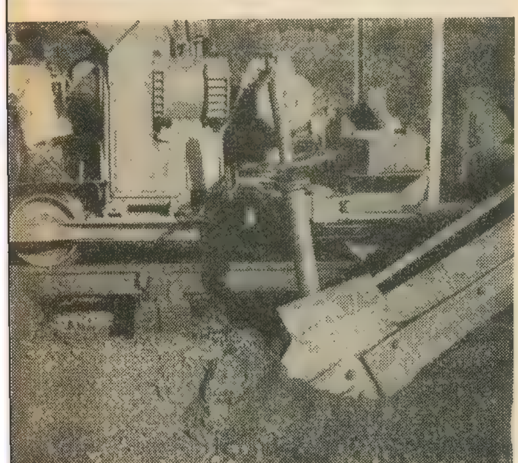
Radiant heat can certainly pass through a vacuum. Makers of vacuum flasks prevent such losses by silvering two of the glass surfaces surrounding the hot tea. A silvered or highly polished surface is a very poor radiator of heat.

Hence heat does not depend on air on any other material medium for its transference and the sun's heat reaches us in just the same way as the heat radiated by a fire. In fact, the mean temperature of the earth may be calculated if the mean temperature of the sun be known and certain simplifying assumptions made. Quoting from memory the earth temperature works out as 17 deg. C.

The aeroplane on the ground is very much warmer than one at 30,000 ft because it is in equilibrium with the air temperature around it. Six miles away from a comparatively warm earth the temperature is many degrees below zero.

Lastly, "What kind of radiations are they . . .? They are electromagnetic radiations similar to radio. light and X-rays, differing only in wavelength, and each one is a wave motion. Herein lies the only flaw in the picture; nobody knows in what medium these waves exist in outer space. The ether was proposed as the medium but, unfortunately, nobody has succeeded in proving its existence and probably nobody will.

Bath. J. P. DE C. BOILEAU.



The ballast clearing machine which Mr Whitehall saw at work near Cefn Station, Wales

BALLAST CLEARER

SIR,—I am enclosing some photographs taken near Cefn Station on the GWR line between Chester and Shrewsbury. The machine seen in the process of excavating is a Matiza, built by a Continental firm (I think in Zurich, Switzerland) and powered by a Leyland 0/600 diesel engine.

The machine's power unit is not coupled to the track wheels, the entire unit being moved along by a cable, one end of which is anchored to the upraised track some 150-200 yd ahead, the other end being taken up on a winding drum.

North Wales. COLIN S. WHITEHALL.

GRANICOS DETAILS

SIR,—Having bought my first copy of ME some 27 or 28 years ago I am now asking for your help. Some few months ago I bought from a junk shop a model of the *Granicos*. This was made by Bassett-Lowke some 27 or so years ago and they have no records of it.

I have contacted Lloyds Register of Shipping, who have kindly given me the following information:—

Granicos: built in Port Glasgow 1919 by R. Duncan and Co. Port of registry Andros, Greek flag. Steel screw schooner of 3,107 gross tons, underdeck tons 2,895, and net tons 1,927. Length 331 ft, Breadth 46 ft 8 in., Depth 24 ft 4 in., Poop 33 ft. Bridge 98 ft. Forecastle 30 ft. 310 n.h.p. Enginemakers: D. Rowan and Co., of Glasgow. Owner: M. Embricos.

Sold to Bryon S. S. Co. in 1923-24 and renamed *Lord Guilford*.

Sold to L. B. Moller in 1932-3 and renamed *Jenny Moller* (the owners later became Moller Line).

Wrecked in 1943.

R. Duncan and Co. have been absorbed by Lithgow and Co., with whom I have been in contact, and they have no records of this ship. When I obtained the model it had been in store for a number of years; the glass case had been smashed and the model had suffered severe damage to the masts and rigging. The rudder and rudder post were missing, the worst damage, however, is to the upper bridge and both wings have disappeared. As I have now almost completed the cleaning of the decks and sorting out of the rigging I wonder if you could help through ME to obtain a picture of her during her life.

Having consulted all the available books in the local library and having been unable to find anything, I have no doubt ME readers will be able to help.

Strangely enough I was able to get some information from the manager of the shop from which I purchased the model, who at one time had been a chauffeur for one of the Embricos family, and he told me that the *Granicos* had been used in the banana trade in the early part of her life, between Jamaica and the Port of London; what she did after she changed hands I have not been able to find out yet, nor do I know where she was wrecked.

I sincerely hope that it will be possible to obtain some information as I am desirous of refitting the model as she was when she was built. I have rerigged with suitable sized rigging and have been even able to rig the lifeboat falls so that they may be raised and lowered in the davits. As the lifeboats are only some 3 in. overall length I feel that the rigging is to scale.

Oxford. T. SHEPPARD.

Readers who have any further information or a picture of the GRANICOS *are invited to get in touch with us.*—EDITOR.

AUSTRALIAN MODEL

SIR,—I have recently completed a $2\frac{1}{2}$ in. gauge, $\frac{1}{2}$ in. to 1 ft, model steam locomotive. The prototype was one of our earlier Beyer Peacock engines for suburban working on the South Australian Railways. The model represents it in its original condition in 1884. There is but one of the full size engines remaining.

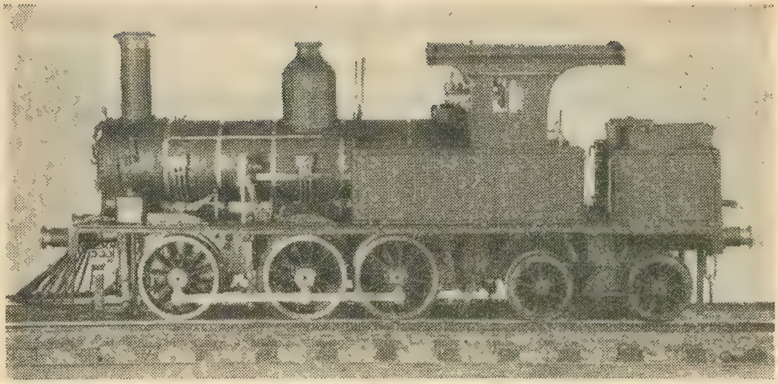
The construction of the model has followed as close as possible to the large engine and has leaf springing, correctly built axle boxes and full brake rigging. The bogie has equalised leaf springing and also cross traverse leaf springs.

The engine itself has cylinders $\frac{11}{16}$ in. bore × $1\frac{1}{16}$ in. stroke with slide valves placed between in a two-section cylinder block, as is the usual arrangement. Valve gear is Stephenson's. The boiler is only 2 in. dia. and has seven $\frac{5}{16}$ in. dia. tubes and operates at 150 p.s.i.

The use of ordinary domestic brass pins has been used extensively in side tank construction.

In the photograph, it is unfortunate that the levers on the spring balance safety valve do not come out more plainly as I had left them bright. They have since been painted black. I understand that a similar engine was in use on one of the Irish railways. They have the same gauge as ours, 5 ft 3 in.

Woodville, South Australia. R. E. SKEWES.



R. E. Skewes' model of an 1884 *Beyer Peacock* 0-6-4 *locomotive*

CONSTITUTION COINCIDENCES

SIR,—I have found Joseph Martin's history of the USS *Constitution* very interesting. Two coincidences have occurred since B. G. Phillips' articles on this ship first began. A few weeks ago I came across a book on ship modelling in a secondhand shop and found it was *Ship Model Making*, Vol. III—How to make a model of the US frigate *Constitution* by E. Armitage McCann, published in New York. (Unfortunately, there are no plans.)

The second incident occurred last week. A friend of mine in Youlegrave, Derbys, sent me some booklets on the ships in Mystic Seaport, Conn., USA and among them were three colour photos of " Old Ironsides."

London, E17. A. STANNARD.

NOTES FROM NZ

SIR,—Gerald I. Kingham's problem [Postbag, May 16] can be solved by tinning the outside race of ball bearings which have become loose in their housings. If a large hot iron and soft solder be used, an even coating can be given without drawing the temper of this ring. Any lumps can be dressed with a chalked file.

I see that in your comments on the results of the competition you say that entries were received from many countries in the world and I wonder whether you remarked that none was received from Australia or New Zealand.

It is perhaps not realised that surface mail to these parts takes around two months to reach us. My copies are posted to me direct but even so I have only just received those of May 9 and 16 last and these issues will not be available through local newsagents for at least a fortnight more. In effect, when news of the competition reached this country it was too late to enter.

My compliments on the present form of MODEL ENGINEER.

Picton, NZ. J. E. ROBINSON.

DIESEL DESIGN

SIR,—There is not much hope for the future of British Railways if the oil-driven locomotive, shown on the cover of ME [July 11] is an example of the new equipment they are buying with public money.

From the drivers' and safety points of view, it perpetuates the worst faults inherent in a steam locomotive with a large boiler, namely the extremely poor view from tiny cab windows, and if there is no fireman to assist in keeping a look-out at dangerous places, how can the driver be blamed for killing a railwayman who may take a little risk in crossing the tracks, if the victim was on the " blind " side ?

Many years ago some large American locomotives, burning heavy oil under their boilers, had the cab at the front; a coal burning locomotive with mechanical stoker could be designed in the same way, while for an electric or oil driven locomotive, to have the driver at the front is a perfectly logical position. Why those responsible for " modernisation " should build new oil-propelled locomotives with the driver's visibility about as good as that found in an early army tank, I am quite at a loss to understand.

London, NW7. H. H. NICHOLLS.

SIR,—While out in my invalid carriage on Wednesday, July 10, I was passing the mineral depot of British Railways about half past eleven. Suddenly I heard an unusual horn sounding and, looking across a lane known as " Lovers Lane," I was surprised to see a four wheeled locomotive with the wheels coupled as in steam locomotive practice. It is half the length of the type shown on the ME cover [July 11]. I could not get close enough so that there may be more than four wheels. It may be a diesel only but there was a guard's van with all the top brass complete with notebooks and a very large amount of freight so that the shunting bosses could find out the power of this far from good looking locomotive. It pulled over two dozen trucks at any rate.

Perhaps some of the clan of model engineers in Glasgow who can get about easier on their legs will be able to find out more about this type of shunting locomotive.

Glasgow. HUGH CUMMING.

THOSE END COVERS

SIR,—In reply to Mr Balleny's letter [Postbag, April 18], the term " Dean Single " does not mean the 3001 or 3031 class only but applies to any engine with one set of driving wheels designed and built during Dean's term of office at Swindon and during this period several classes of 2-2-2s were also built. It is a pity, therefore, that the more correct term of Bogie Single for the 3031s was not used.

My letter [Postbag, March 21] containing the close-up of an end cover simply stated this was an end cover for a Dean Single and is part of a large photograph I have of the

driving centre of GWR No 10 *Royal Albert*, a 7 ft 2-2-2. This engine was originally built in 1886 as a 7 ft 8 in. single and rebuilt in 1890 as a 7 ft Single at which time she received the end cover I showed.

Mr Maskelyne and I discussed the shape of the Bogie Single end covers a long time ago. Several original photographs of Bogie Singles were examined, most of the broadside views showing rounded corners as long as the light reflections were not too bright.

Other reasons led us to believe that the shape was rounded. The degree of standardisation of details practised by Swindon from very early days is not always appreciated. Moreover, engineers of the status of Dean, Stroudley, Johnson, etc., made a study of the application of art to engineering and a study of details in the Dean period show that straight lines were swept into each other either by a 90 deg. transition or a compound curve, i.e. of a radius greater than the 90 deg. centre swept in with curves of radius less than the 90 deg. centre, and an octagonal shape even with rounded corners is not in keeping from an artistic point of view on a prominent piece as an end cover.

As the original query was about the shape of the raised part of an end cover the photograph showed that part only with just enough detail included around it to identify the railway to those who know anything of that railway's locomotives of the period.

I will agree that the proportions of the backplate are different but those of the raised part and the front lubricator compare with those on the general arrangement and it is not unknown to add a piece to a pattern as would be done for an axle box with a sunk oil pocket, as on No 10.

Again, the horncheek is a standard horseshoe steel casting and whether the top edge is brought beyond the frame will depend on frame strength requirements and which type of axlebox is fitted.

Anyhow to settle the question I wrote to Swindon giving all the information I have together with a drawing showing the three alternative shapes. They have now provided a drawing of the driving axle box complete with the end cover as fitted to Lots 84, 86, 94, 95 and 110 (Bogie Singles Nos 3001-80) and this shows that all corners to be swept round as 90 deg. transitions. The accompanying letter confirms that all the 3031s had this type of end cover throughout their existence and most of the other Singles were fitted with them during the 1890s.

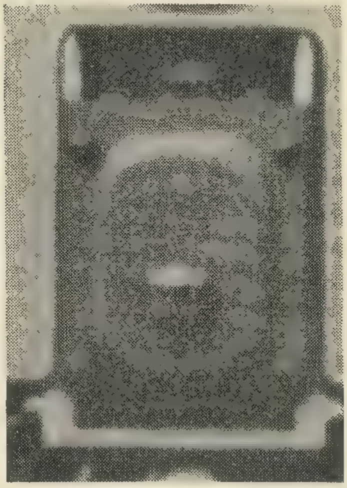
Two photographs of Bogie Singles were also supplied. On one the end cover is left polished while on the other this has been painted over for photographing. Side by side they are a good example of the distortion that can occur when photographing a polished surface of the shape in question and confirm my contention that unless the photograph is a close-up taken square on it is easy to get a false impression of the actual shape.

I find Mr Balleny's inference that he doesn't know me or my model rather surprising as we have corresponded for some time. Our models have been together both at Birmingham and at the 1955 Model Engineer Exhibition, where the remark which caused all this was made to him as an item which spoiled a very fine job. In addition a photograph of my chassis in MODEL ENGINEER of 30 September 1954 clearly shows the axle boxes as correct.

To anyone interested in GWR relics I would recommend that they visit No 1 corridor of Paddington General Offices; among others are two large and clear photographs of Bogie Singles.

D. G. WEBSTER.

We have seen the official drawings and photographs Mr Webster mentions and we confirm that his descriptions are correct.—Editor.



The Single-wheeler, No 3032 and, above, enlarged views of the end covers showing how polishing (right) seems to induce an octagonal effect

CLUB NEWS

EDITED BY THE CLUBMAN

HOW club members can work together on a large project, each of them contributing his own special skill, is admirably suggested by the construction of a new headquarters for the Cumberland Guild of Model Engineers and Craftsmen.

The workshop-clubroom, a brick structure measuring 60 ft × 20 ft and insured for £2,000, took the members two years to build. Work began on the foundations at Easter 1955, and all the work thereafter was done by the committee with a few other members and the assistance of a friendly bricklayer and a professional plasterer. Eric Hall, a joiner member, designed, constructed and fitted the roof, and member Stan Vaughan, using aluminium conduit given by the local branch of High Duty Alloys, wired the building throughout.

When the headquarters was finished the Guild arranged for it to be opened by D. R. Wattleworth, director and general manager of the Workington Iron and Steel Company, with the local community well represented.

ME DIARY

August 10 Telford Bicentary Exhibition, Institution of Civil Engineers, Great George Street, Westminster. 10 a.m.-8 p.m. (last day).
August 11 MPBA South London radio-control regatta.
August 14 Isle of Wight MES Exhibition, County Secondary School, Newport, (August 14-17).
August 17 The Weald of Kent Traction Engine Club, rally of traction engines and steam rollers, The Old Recreation Ground, Paddock Wood, near Tonbridge, Kent.
August 18 Birmingham SME members' social day.
MPBA Southampton regatta.
August 21 Model Engineer Exhibition opens at New Horticultural Hall, Westminster, 11 a.m.-9 p.m. (Aug. 21-31, except Sunday).
August 24 Huddersfield SME regatta.
Birmingham SME track at High Duty Alloys sports field, Redditch.
Bethnal Green SMEE at Borough of Leyton Show, Coronation Gardens, Leyton, London.
August 25 Malden and District SME annual loco gala day. Invitation to all ME Exhibition visitors.
August 31 Last day of Model Engineer Exhibition.
September 1 MPBA Grand regatta.
September 6 Rochdale SMEE "Building the Seal," H. Bonsor.

The community, indeed, gave its support very readily, and the same eager co-operation was shown by the **Carlisle MES** and by Colonel Hugh Simpson and friends from the colonel's Hutton-in-the-Forest Railway.

The building, which stands near the Guild's 800 ft continuous track, has 11 in. cavity walls, an asbestos roof, and mains electricity, the single and three-phase supply cable having cost £48 to connect.

By the time of the opening the Guild already had several machines, the gift of local firms who would otherwise have discarded them. They included a 6 in. lathe, BG and SC surface grinder, vertical miller, capstan lathe, drill and double-ended bench grinder.

The Tramways Museum in Maine, described in the July 25 issue of ME provides an example from the USA of a society thriving "on the sheer enthusiasm of its members" and enjoying in consequence the respect and goodwill of the people outside.

Here, in the land of Rogue Herries and Red Ike, we find something of the same spirit—a club which gathers a double reward through helping itself. No wonder that more than 30 members of the **West Riding Small Locomotive Society** can find it worth while to travel more than 200 miles for a few hours with the Cumberland Guild of Model Engineers and Craftsmen.

Should you be on holiday in Cumberland the Guild's secretary is W. Tully, of 28 Coronation Street, Maryport.

IT DOES, YOU KNOW!

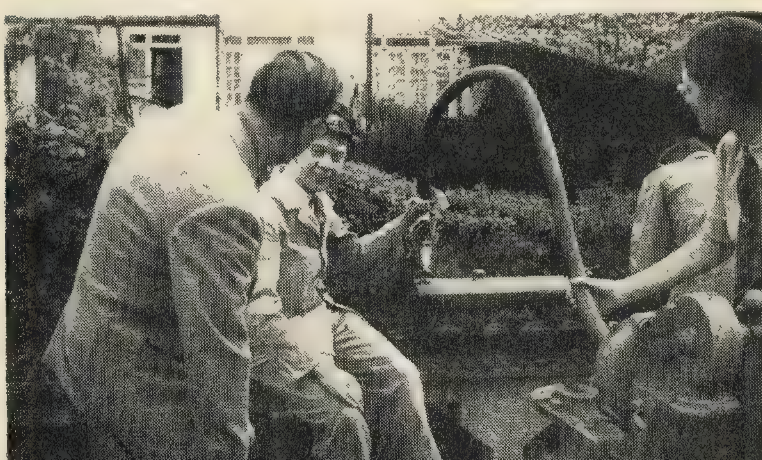
It pays to advertise in MODEL ENGINEER.

Among the thousands who have made this happy discovery are the members of **Exeter and District MES.** They wanted a vertical boiler; they got it through the ME advertisement columns, and now they have plenty of steam for all comers. The engines draw their steam from a buspipe connected with the boiler and running along part of the workroom.

George Sinclair's Steaming Nights (with anything welcome, up to a 1 kW generator) are only one aspect of the activities at Exeter.

When I last heard from the society, the O gauge committee was then developing plans for additions to the layout, and the control desk was being modified to give visual indications of the track sections occupied—a work for which W. J. Hunt made 48 relays. Fuses were changed to circuit-breakers for the main supplies, and here the chairman was again busy; he designed and made the complete set with remote-controlled resetting and trip-indication.

Need we be surprised that Exeter and District MES continues to bring in new members, some of them young? Cumberland and the West Country are far apart, but there is a strong similarity between them in spirit (as Hugh Walpole discovered in his literary journeys from Truro to the fells) and we find it not least in model engineering.



Miss Ann Carter working blower for raising steam at Sutton MEC open day

Model Engineer

Classified Advertisements together with remittance should be sent to Model Engineer, 19/20, Noel Street, London, W.1, by latest Thursday morning prior to date of publication. Advertisements will be accepted from recognised sources by telephone. GERRARD 8811. Ex. 4

CLASSIFIED ADVERTISEMENTS

★ Private: 3d. per word. Trade: 6d. per word. Minimum 12 words. Use of box 1s. 0d. extra.

★ Rates for displayed advertising in this section. Trade 35s., Staff 45s. per single column inch. (Column width 1⅝ in.)

The Advertisement Manager reserves the right to refuse or suspend advertisements without giving any reason. Every care is taken to avoid mistakes, but the publishers cannot be held liable in any way for printing errors or omissions. Receipt of "copy" for publication implies acceptance of these conditions by the advertiser. Whilst every care is taken to exclude advertisements from doubtful sources, no responsibility can be accepted by the publishers for the bona fides of advertisers.

WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Workshop Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London, N.W.1. Phone: Euston 4661.

£125. Boxford Model A 4½ × 22, Norton gearbox, motorised on Boxford cabinet. Set chucks, collets, etc. Cost £300.—2, Isabella Road, Homerton, London, E.9.

3½ in. Poole Special Lathe, B.G.S.C. Complete with chucks, change gears, compound slide rest. Cabinet C/shaft. ¼ h.p. B.T.H. motor. Practically unused. Offers—Box No. 8580, MODEL ENGINEER Offices.

ML7 1/3 Motor, cabinet, three 4-jaw drill chucks, swivel vertical slide accessories. 0-½ bench drill, "Hielan Lassie" chassis, small compressor ¼ motor need assembly, hardly used, stored. Quantity "M.E." Write, appointment, £65.—DAPLING, 40, Oundle Avenue, Bushey Heath, Herts.

£65. M.L.7 motorised on Myford cabinet, universal slide, chucks, tools, etc.—2, Isabella Road, Homerton, London, E.9.

Drummond Lathe, 4", bench mounted, motorised, £25. Evenings, weekends.—RYAN, 13, Stevenson Road, Hedgerley, Slough, Bucks.

Good Condition Workshop Equipment, Myford M.L.7 lathe, 230 V motor, 4" s.c. chuck, steady, two faceplates, clamp carrier, drill chuck, back tool post. Also Fobco Star ½" chuck drilling machine and Wolf 6" double end pedestal grinder. Seen after 7 o'clock evenings. £95 the lot, o.n.o.—HALL, 91, Framlingham Cres., Mottingham, London, S.E.9.

Mail Orders. New bargains, post 1s. extra under £1. Sets H.S. drills No. 1-60 with stand, 50s. H.S. drills, 29 different, 1/16" to ½", stand, £3 10s. Dies 13/16" 40 t.p.i. 5/32", 3/16", 7/32", ¼", 3s. 4d. each. Taps 40 t.p.i. 5/32", 3/16", 7/32", ¼", 2s. each. Stillson wrenches 6", 4s. 6d., 8" 6s., 10", 7s. 6d. Hand drills ¼", 10s., Breast ½", 27s. 6d. Drill chucks ½" No. 1 or 2 M.T., 10s. 6d. Superior 16s. 6d. Burnerd independent chucks 4", 72s., 4½" 75s., 6" £6 4s. 6d. H.S. small milling cutters, 6 different, 9s. H.S. tool bits, ¼", 1s. 6d., 5/16", 1s. 11d., ⅜", 2s. 3d. Vee blocks 3", 6s., 4", 7s. 6d. Angle plates 3", 6s., 4", 10s. H.S. centre drills size 1, 2s., 2, 2s. 3d., 3, 2s. 9d., 4, 3s. Precision drill chucks ½" No. 2 M.T., 44s. Machine vices 18s. 6d. Wood chisels set ¼", ⅜", ½", ⅝", 1", 16s. 12 different 1/32"-9/16" round silver steel, 10s. Expanding wood bits ½"-1½", 14s., ⅞"-3", 19s.—S. GRIMSHAW, 7, Hall Street, Manchester 18.

Wanted. Myford Super 7 motorised, good condition, reasonable price.—MARSDEN, 5, Shear Bank Gardens, Blackburn.

Sale. E.W. Lathe, leadscrew, countershaft, boring-table, drill chuck, £20.—LANGDON, 2, Elysian Cottages, Halberton, near Tiverton, Devon.

MODELS AND FITTINGS

10¼ Gauge 4-4-0 bogie tender locomotive in steam at 100 lb. last year, also three 6' bogie trucks. The whole for disposal at bargain price. Offers invited, inspection by appointment. Further particulars—BRIGGS, "Wayside," Shripney, Bognor Regis.

Wanted. Approximately 500', 5" gauge track.—HARRIS, Sundale, Brickyard Lane, Studley, Warwicks.

Wanted. 15 c.c., 4-stroke petrol engine.—73, Hill Top Road, Warley, Oldbury, Birmingham.

Sale. 3½" gauge "Juliet" new, engineer built. Maker of six successful locomotives, £35.—HARRISON, 18, Wyberton West Road, Boston, Lincs.

6' Hull Wanted, suitable paddler. Also coal-fired boiler for same cheap, will collect. —C. ARNOLD, 8, Homestead Way, Northampton.

Traction Engine Wanted, model to 3". Write airmail to—ORLANDO CORNELL, Sidney, New York.

KENNION'S CATALOGUES

Tool and Materials 9d.
L.B.S.C. Blueprint & Castings. 1s.
Refunded on first 20/- order

3½" G. Handrail Knobs
3s. 6d. dozen
OVERSEAS ORDERS A SPECIALITY
2 Railway Place, Hertford *Phone 2573*

Want Flying Scotsman 4-6-2 with tender in all gauges. Also want Maerklin gauge "O" L.N.E.R. "Cock o' North" 2-8-2 with tender. Old model locomotives, trains, trams, in gauges O, I, II, III, IV. Also want any models of model dockyard, and catalogues. Will send new trains or American dollars.—W. S. POPEK, 15, Main Street, Garfield, N.J., U.S.A.

Will Exchange "P. V. Baker" wheel and cylinder castings for "Juliet" cylinder castings.—HEYWORTH, Hockerley Lane, Whaley Bridge, Stockport.

ELECTRICAL

A.C. Motors, Self Start, induction 200/250 volts, 50 cycles, 1-phase, 1,425 r.p.m., ¼ h.p., £4 2s. 6d., 1/3 h.p., £4 19s. 6d., ½ h.p., £6 15s. Perfect and guaranteed. Carriage extra.—JOHNSON ENGINEERING COMPANY, 319, Kennington Road, S.E.11. Reliance 1412/3.

Wanted. Miniature magneto commercial type for single cylinder engine. Eisemann preferred. Height of magnet not to exceed 3¼".—Box No. 8592, MODEL ENGINEER Offices.

GENERAL

Air Compressors, tanks and accessories at far below list, from £5 17s. 6d., TV and lighting generator from £15.—TEDDINGTON ENGINEERING CO. LTD., 29-31, High Street, Teddington, Middx. Tel.: Kingston 1193.

Watches, any make repaired (with guarantee) post confidently to—YOUNG & SON, 133, London Road, Chippenham, Wilts.

Spraying Handbook, 3s. 10d. post free. Paints, cellulose and allied spraying sundries. Catalogue, 2½d.—LEONARD BROOKS, 25, Oak Road, Harold Wood, Romford.

Build Your Own Refrigerator. All components available at reasonable prices. Frigidaire units, £5. Single cylinder units, £4. New G.E.C. Coldair hermetically sealed and absorption units in stock. Hire purchase available. Heavy duty motors, 1/6 h.p., £2 10s. New chrome cabinet handle and hinges, £1 set. Money back guarantee. S.A.E. for list and schematic diagram.—WHEELHOUSE, 11/13, Bell Road, Hounslow. Phone: Hounslow 3501.

Aqualung and compressor equipment.—PRYCE, 157, Malden Road, Cheam.

Learn It As You Do It.—We provide practical equipment combined with instruction in radio, television, electricity, mechanics, chemistry, photography, etc. Write for full details to—E.M.I. INSTITUTES, Dept. ME47, London, W.4.

Capacity Available machining metal. and plastics. Prototype and small batch Quotations given.—Phone: SYD 3796.

Over 200 Sections of Brass, bright and black m. steel in stock, s.a.e. for list. (Closed Aug. 10-24.)—B. J. HARRIS, The Cottage, Congreaves Hall, Cradley Heath, Staffs.

Boat Steam Plant ½" bore piston valve, water tube boiler, complete £4 10s. Tangye steam engine ½" bore, £3 10s., partly completed Bat loco wheel casting fitted and boiler, £2 10s.—ARTHURS, New House, Uplowman Cross, Tiverton, Devon.

Guaranteed! Easy-Home Constructed Refrigeration. Genuine domestic components. Not secondhand ice cream scrap. Modern hermetic G.E.C. units, gas, electric and oil silent unit. Everything for refrigeration. Complete specialists. Send s.a.e. for free illustrated "Sealed system" leaflet or 1s. for complete catalogue (refunded with first order).—BRAID BROS., 50, Birchwood Avenue, Hackbridge, Surrey. Phone: Wallington 9309.

Bumble Bee & Busy Bee, 50 c.c. auxiliary engines by Edgar T. Westbury. Send s.a.e. for list of our super-castings and all accessories for these engines.—BRAID BROS., 50, Birchwood Avenue, Hackbridge, Surrey. Telephone: Wallington 9309.

Compressors for Sale. Two pistons complete with air receiver, driving wheel and motor cradle, 180 lb., 2½ cu. ft., price £3. Motors a.c. and d.c. all types ¼ h.p., £3. Carriage forward.—WHEELHOUSE, 13, Bell Road, Hounslow. 'Phone: Hounslow 3501.

Timber cut, planed and bandsawn. Boat hulls and fittings to order.—ROY CLARKE, 49, Lord Street, Macclesfield.

Wanted. Turning/screwcutting. Accurate work, prompt. Home workshop.—Box No. 8581, MODEL ENGINEER Offices.

Engraver, Jig Saw, "Tich" boiler, chassis, Decapod chassis, boiler.—V. BESWICK, 36, Annesley Road, New Moston, Manchester, 10.

Model Railway Operation and Maintenance, by E. F. Carter. In Part I of this book, devoted to operation, the author shows how it is possible to introduce realistic traffic movements on even the smallest layouts. In Part II, maintenance, he has included as much "trouble-shooting" information as possible. The result is that the reader has all the essential data on both operational and maintenance aspects. From your bookseller, price 6s. 0d., or 6s. 8d. post free from—PERCIVAL MARSHALL & CO. LTD., 19-20, Noel Street, London, W.1.

Wanted. Flintlock or percussion cap pistols, best prices paid for single or pairs also powder and shot flasks.—DOGGETT, Bartholomew House, Newbury. Tel.: 111.

Unowot Whiston's sell. S.A.E. catalogue.—K. R. WHISTON (Dept. M.E.S.), New Mills, Stockport.

Work Undertaken by precision engineer with private workshop, singles or repetition.—PERFECT, 35, Fuller Road, Watford, Herts.

Traction Engine catalogues wanted, any reasonable price paid.—M. L. FINCH, 10, Willow Avenue, Swanley, Kent.

Model Railway Illumination, by E. F. Carter. Written for the large number of enthusiasts who delight in watching full-size railway operations being carried out after dark. A practical handbook on the subject in miniature in all its aspects. Gives all the theory and practical data needed to enable a layout to be adapted for "night operation." Price 3s. 6d. from your bookseller or 3s. 9d. post free from—PERCIVAL MARSHALL & CO. LTD., 19-20, Noel Street, London, W.1.

RECENTLY PUBLISHED

Workshop Hints and Tips

by GEOMETER

HERE are fifty-nine instructional articles in book form, reprinted from the "Beginner's Workshop" series in *Model Engineer*. These are published in magazine size format (size 7¼ by 9¾ in.) with attractive board cover. By using the original type and illustrations it has been possible to effect a big production economy and to pass this on to the reader in the form of a really comprehensive manual at low cost.

"Geometer" covers the identity of a professional engineer with long experience of workshop practice. The material published has been carefully selected to suit the needs of the small workshop man and the book will be found to be of great practical help as a quick, handy form of reference to the various tricky operations that arise from time to time. There are over 100 illustrations. **3s. 6d.** POST 3d. (U.S.A. AND CANADA $3.00)

On Sale at the Percival Marshall Stand at the M.E. Exhibition or by post from

PERCIVAL MARSHALL & Co. Ltd. 19-20 Noel Street, London, W.1

Model Engineer EXHIBITION

And now for the first time:

TICKETS OBTAINABLE IN ADVANCE

It is now possible to obtain your ticket in advance. This saves queueing at the entrance. Send your remittance to the Exhibition Manager, 19-20, Noel Street, London, W.1.

Admission 3/- **Under 15's 1/6**

11 a.m. to 9 p.m. Closed Sunday. *Special rates available for parties of 12 or over. Apply to Exhibition Manager at address above.*

Help the Exhibition by displaying:

POSTERS (Two sizes)

CAR WINDOW STICKERS

LETTER STICKERS

The posters are size 30 in. by 20 in. and 11½ in. by 14 in. car window stickers 6 in. by 4 in. and letter stickers 3 in. by 2 in. Apply to Exhibition Manager, 19-20, Noel Street, London, W.1, for free supplies.

NEW HORTICULTURAL HALL, WESTMINSTER • AUG 21–31

THIS YEAR'S ATTRACTIONS : Workshop and model engineering demonstrations. Railway and signalling layouts. Radio controlled ships and model power boat demonstrations on the water tank. Model car racing. The live steam track. Electronic marvels at "puzzle corner." R.A.F. model jets. Displays by the model clubs. Demonstrations on the trade stands.

Model Engineer

CLASSIFIED ADVERTISEMENTS

- PRIVATE RATE 3d. A WORD
- TRADE RATE 6d. A WORD
- MINIMUM 12 WORDS
- BOX NUMBER 1/- EXTRA

To "MODEL ENGINEER" Classified Advertisement Dept.,
19-20, Noel Street, London, W.1

Please insert the advertisement below under

heading..............................for..............................insertions

Name ....

Address ....

Name and address, if to appear, must be paid for.

....	....	....	....	....	....
....	....	....	....	....	....
....	....	....	....	....	....
....	....	....	....	....	....
....	....	....	....	....	....

Three insertions for the price of two. ★ Private advertisers only.

Please write in block letters. REMITTANCE VALUE .... ENCLOSED

Printed in Great Britain for the Proprietors by ELECTRICAL PRESS LTD., Cordwallis Works, Maidenhead, Berks, and published by PERCIVAL MARSHALL & CO. LTD., 19-20, Noel Street, London, W.1.
Registered for transmission by Magazine Post to Canada including Newfoundland.

M.E. QUERY COUPON AUGUST 1957